Subcontractor Report

December 2002 • NREL/SR-510-32999

Feasibility Study for Bioethanol Co-Location with a Coal Fired Power Plant

November 29, 2001—July 28, 2002

BBI International
Cotopaxi, Colorado

National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, Colorado 80401-3393

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Operated by Midwest Research Institute • Battelle • Bechtel

Contract No. DE-AC36-99-GO10337

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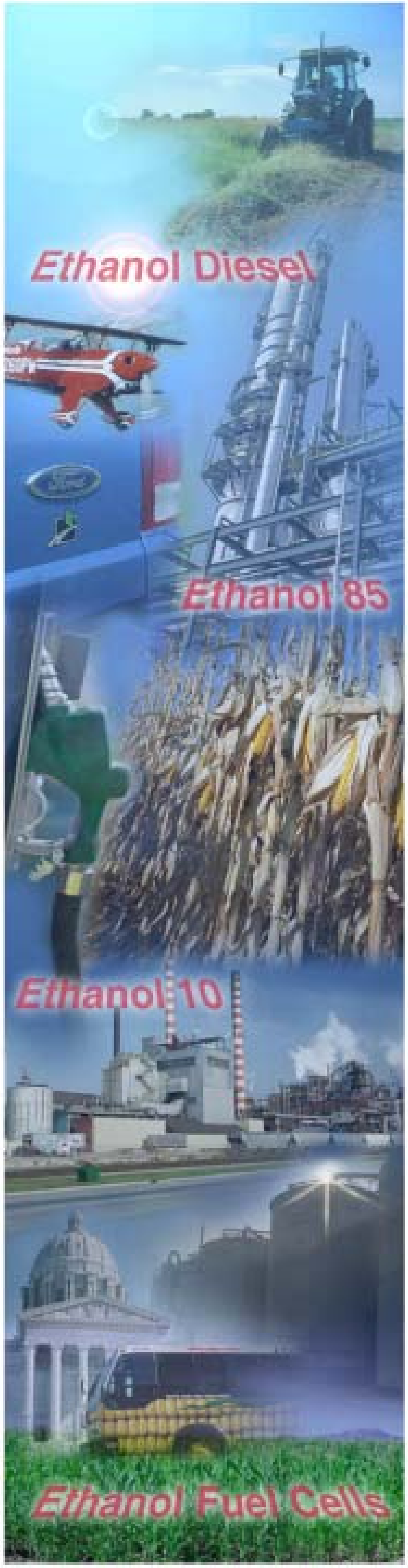

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NREL Technical Monitor: Robert Wallace

Prepared under Subcontract No. ACO-2-31092-01

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Abstract

A key issue for bioethanol commercialization is the current high capital cost for cellulosic based facilities. Lowering the capital cost will ease debt and equity requirements and will expand the market opportunities as more organizations such as farmer cooperatives will be able to raise the required equity for plant construction. Farmer cooperatives are one of the major drivers behind the current expansion of corn-based ethanol production as farmers strive to add value to their agricultural products.

Co-location with coal-fired power plants presents an opportunity to lower the capital cost of bioethanol plants by eliminating the lignin-fired boiler included in most greenfield designs. The lignin-fired boiler can represent up to 30% of the bioethanol capital cost. Integration of the ethanol operations with the power plant could benefit both facilities (purchasing of steam from the power plant and sharing of overhead costs such as maintenance for example). A Midwest location was selected for this project due to the abundance of corn stover as well as the potential for energy crops such as switchgrass. Coal fired power plants are also very common in the Midwest, which should result in numerous co-location opportunities.

Agricultural residues clearly dominate available biomass resources for near-term bioethanol production. Considering that corn stover alone represents 80% of the available agricultural residue in the United States, corn stover is the most abundant and most likely feedstock for near-term bioethanol production. Estimates of ethanol production potential from corn stover easily exceed 3 billion gallons per year and this feedstock is concentrated in the Midwest, unlike other feedstocks, which are more dispersed.

This study looks at the feasibility of co-locating 30, 50 and 70 million gallon per year bioethanol facilities with coal fired power plants in Indiana and Nebraska. Corn stover is the feedstock for ethanol production in both cases.

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I. EXECUTIVE SUMMARY

The National Renewable Energy Laboratory (NREL) has retained BBI International (BBI) to conduct a feasibility study to determine the feasibility of co-locating bioethanol plants with coal fired power plants in the Midwest. The bioethanol plants modeled in this study utilize the dilute acid/enzymatic technology under development at NREL and other organizations throughout the country. The ethanol plant performance and equipment costs were provided by NREL and are based on NREL's projections for plant performance and costs as specified in their latest design report "Lignocellulosic Biomass to Ethanol Process Design and Economics Utilizing Co-Current Dilute Acid Prehydrolysis and Enzymatic Hydrolysis For Corn Stover" issued May 2002.

BBI completed the following seven tasks to determine the viability of ethanol production from corn stover. The subcontract tasks are:

- Site Selection
- Feedstock Supply
- Design and Cost Estimate
- Financial Evaluation
- Environmental Issues
- Socioeconomic Issues
- Market Issues

The results for each task are summarized here and BBI's assessment of the feasibility of ethanol production from corn stover and recommendations for further work follows.

Site Selection

Ten sites were evaluated to determine which two sites would be the best sites for co-location of a bioethanol plant with an existing coal-fired power plant or coal-fired industrial boiler. Corn stover is the preferred feedstock for this analysis, but rice straw, wheat straw and spent brewers grain feedstocks were also considered. The amount of feedstock available must be able to support a reasonable size bioethanol plant – 30 million gallons per year or larger. Smaller plants would not support DOE's long-term goals for bioethanol production and industry growth.

The final two sites selected for the study were the Nebraska Public Power District site in Grand Island, Nebraska and the RM Schahfer Generating Station in Wheatfield, Indiana.

Nebraska Public Power District (NPPD) is actively seeking a steam co-host, especially a large ethanol plant, for a new coal fired power plant to be built near Grand Island, Nebraska. Selecting NPPD's Grand Island site provides an opportunity to evaluate co-location opportunities from "the ground up" and to maximize the synergies between the two facilities. NPPD plans to build a power plant in the 400 to 600 MW range at the Grand Island site

The Northern Indiana Public Service Company's RM Schahfer Generating Station is located on 2,800 acres just northeast of the community of Wheatfield in northwestern Indiana. The site is less than 100 miles from Chicago. Total nameplate capacity of the facility is 2,200 MW. There are several areas around the generation station that Northern Indiana Public Service Company (NIPSCO) would like to develop.

Feedstock Supply

There is sufficient production of corn and therefore, corn stover near the Indiana site to easily supply bioethanol plants from 30 to 70 million gallons in annual capacity. A 30 million gallon per year plant at the Wheatfield, IN site would use just 17% of the stover available on a sustainable basis within 50 miles of the site (assuming 70 gallons of ethanol are produced from each BDT of stover). A 70 million gallon per year (MMGPY) plant would use 40% of the stover available within 50 miles of the plant. "Available" stover in Indiana is assumed to be 45% of the stover that is produced with 55% left in the field for erosion control.

Significantly more corn is grown in the area surrounding the Grand Island, Nebraska site. A 30 million gallon per year plant at the Grand Island site would use 12% of the stover available on a sustainable basis within 50 miles of the site (assuming 70 gallons of ethanol are produced from each BDT of stover). A 70 MMGPY plant would use 28% of the stover available within 50 miles of the plant. "Available" stover for the Nebraska site is assumed to be 56% of the stover that is produced with only 44% left in the field.

The estimated cost to deliver corn stover to the Grand Island, Nebraska site is $33.86 per BDT, and the estimated cost at the Wheatfield, Indiana site is $38.62. The lower corn yield per acre in Indiana and the requirement to leave more corn stover in the field, results in higher bailing costs per ton of stover and the stover must be collected over a greater distance resulting in higher transportation costs for Indiana.

Sources of competition for corn stover that could potentially create significant increased demand and drive up the price for corn stover are nonexistent in the project areas. There is so much corn stover available in these areas that increased prices due to competition are difficult to envision. Pulp and paper production and electricity are perhaps the only two existing markets that could create a sizable demand for corn stover. The production of certain commodity chemicals from corn stover could also create a large local demand. All of these applications using corn stover feedstock are conceptual at this time and predicting the impact on local corn stover pricing would be highly speculative.

Competition for corn stover will be avoided in the same manner as in the current corn ethanol industry: ethanol plants are not sited near other ethanol plants where they will create a large increase in the local corn price. It is well known that creating a large local demand for corn will drive up the local price of corn so project developers look for sites with a large excess of corn. Plants that use corn stover will not be located next to other users of corn stover because both business would suffer due to higher corn stover prices.

Lenders usually will not fund the “second” project that is too close to another project that uses the same feedstock.

The bioethanol plant itself will create the greatest risk related to feedstock competition. Unless the bioethanol plant has a secondary or backup feedstock, it will be 100% dependant on corn stover supply and the plant may find itself at the mercy of the feedstock suppliers and corn growers. This will be a key issue for lenders. Long-term contracts for the corn stover can help to mitigate this risk, but contracts can be broken. Another option that would help would be for the owners of the corn stover, i.e. farmers, to have significant ownership in the bioethanol facility. It would then be in their best interest to make sure the plant always had an adequate supply of corn stover at a reasonable price.

Finally the only other possible source of serious competition for corn stover would be the loss of corn acreage to another crop or another use. Conversion of #2 yellow corn to silage is one example. Silage requires the removal of the most of the corn plant and there would be little stover available. The National Corn Growers Association is predicting an increase in the number of corn acres in the future, however, driven primarily by the demand for fuel ethanol so this is not a likely scenario.

Corn stover is currently not harvested on the scale required for a large ethanol plant and the long-term impacts of harvesting corn stover are also not well known. The lack of an ongoing, large scale corn stover harvesting, storage and delivery operation will be a serious issue for lenders that project developers must address.

Design and Cost Estimate

Ethanol plant sizes of 30, 50 and 70 MMGPY of anhydrous ethanol production match today’s industry norms and were modeled to determine the impact of plant size on project costs. Bioethanol plant capital cost estimates were provided by NREL and the NREL equipment costs were used in the analysis as the basis for the BBI cost estimates. BBI assigned equipment installation factors to the equipment costs to arrive at the installed cost. The equipment installation factors are derived from actual costs for corn ethanol wet and dry mills. Table 1 shows the estimated capital costs for the bioethanol facilities.

Table 1 – Capital Cost Summary

Capital Investment Summary			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Capital Hard Cost Investment	$ 65,521,275	$ 92,403,780	$ 116,581,752
Capital Soft Cost Investment	$ 7,280,142	$ 12,600,516	$ 18,978,425
Total Capital Cost Investment	$ 72,801,417	$ 105,004,296	$ 135,560,177

Financial Evaluation

The approach for the financial analysis was to use conservative assumptions throughout to arrive at an estimate of the minimum return that can be reasonably expected for the project based on the capital costs estimated by BBI and the plant performance criteria provided by NREL.

Ethanol plant sizes of 30, 50 and 70 MMGPY of anhydrous ethanol production were modeled to determine the impact of plant size on profitability. Bioethanol plant capital costs were estimated by BBI and operating cost estimates were provided by NREL. NREL also provided the estimated ethanol and byproduct yields, energy consumption and utility and chemical usage for the ethanol plant. The NREL design is for an n^{th} plant design and, therefore, does not include additional costs that will likely be incurred by the first generation of bioethanol plants to mitigate the risks associated with commercializing new technologies. The ethanol plant is assumed to be designed for a 20-year project life and equipment is depreciated over 20 years in the project proforma.

Construction of the project is assumed to take 14 months followed by four months of startup. During startup, ethanol production is assumed to be 25% of nameplate capacity during the first month, and then 50%, 75% and finally 100% in the second, third and fourth months of startup.

Internal Rate of Return (IRR) was used to measure the profitability of the proposed projects. The results for Indiana are summarized in Table 2 and the results for Nebraska are shown in Table 3.

Table 2 – Modeling results for the Wheatfield, Indiana site

	30 MMGPY	50 MMGPY	70 MMGPY
Internal Rate of Return (IRR)	**-5.7%**	**3.3%**	**10.7%**
Average Annual Net Earnings	**$2,783,000**	**$6,190,000**	**$10,794,000**
Capital Cost per Gallon ($/gal)	**$2.18**	**$1.85**	**$1.67**
Ethanol Plant Capital Cost	**$65,521,000**	**$92,404,000**	**$116,582,000**
Owner's Costs	**$8,173,000**	**$10,732,000**	**$13,297,000**
Total Project Investment	**$73,694,000**	**$103,136,000**	**$129,879,000**
40% Equity	**$29,477,600**	**$41,254,400**	**$51,951,600**

Table 3 – Modeling results for the Grand Island, Nebraska site

	30 MMGPY	50 MMGPY	70 MMGPY
Internal Rate of Return (IRR)	**18.6%**	**23.6%**	**29.3%**
Average Annual Net Earnings	**$7,522,000**	**$12,754,000**	**$19,188,000**
Capital Cost per Gallon ($/gal)	**$2.18**	**$1.85**	**$1.67**
Ethanol Plant Capital Cost	**$65,521,000**	**$92,404,000**	**$116,582,000**
Owner's Costs	**$8,096,000**	**$10,602,000**	**$13,117,000**
Total Project Investment	**$73,617,000**	**$103,006,000**	**$129,699,000**
40% Equity	**$29,446,800**	**$41,202,400**	**$51,879,600**

The projected IRRs for the Nebraska project are significantly higher than the Indiana project because of the state producer payment in Nebraska, the lower estimated feedstock cost and the lower energy (steam and electricity) costs at the Nebraska site.

Environmental Issues

Based on the assumptions stated in this report, and the air permitting regulations in place at the time of this report, the feasibility of obtaining air permits for the proposed bioethanol facilities is excellent. The most significant issue is the boiler emissions for larger bioethanol facilities and remaining a Minor Source. Permitting a Major Source facility will be more difficult, more time consuming and more expensive. Operational monitoring and reporting requirements will also be more expensive.

The timeframe from the preparation of the air permit application to the issuance of an air license is estimated to be approximately 6 to 12 months for a Minor source and more than a year for a Major Source.

Obtaining other permits for the proposed bioethanol facilities should be no more difficult than permitting a corn dry mill ethanol plant. Environmental impacts and community impacts would also be very similar to those for a dry mill. Locating the bioethanol facility away from residential areas can minimize community impacts. An industrial park or land zoned "industrial" may not be suitable if it is near towns and communities. Wetlands and areas with known endangered species and archeologically sensitive areas should also be avoided when siting the ethanol facility.

Socioeconomic Impacts

The construction spending associated with building a 50 MMGPY bioethanol plant will add approximately $250 million to the final demand in the local economy and generate

$81 million in new household income and provide for more than 2,500 direct and indirect jobs during construction.

During commercial operations the 50 MMGPY bioethanol plant will create from 534 to 610 new jobs depending where the plant is located. New household income will be approximately $17 million annually and annual state and local taxes are estimated to be $1 million on new earnings.

Market Issues

The primary market drivers for fuel ethanol in the U.S. are MTBE replacement, a Renewable Fuels Standard, federal and state tax incentives, octane requirements and the Reformulated Gasoline program. Ethanol pricing is affected primarily by the rack price of gasoline and state and federal incentives. However, an oversupply in local markets can necessitate a discounted price or higher transportation costs to get the product to a market with unsatisfied demand.

The phase out of MTBE will have a significant positive impact on the ethanol market, as ethanol is the most likely product that will be used to replace MTBE as it is phased out. MTBE and ethanol extend the volume of gasoline, enhance octane, and provide oxygen. Ethanol, as an octane enhancer, can substitute for benzene and other aromatic hydrocarbons. This substitution reduces the emissions of benzene and butadiene, both of which are highly carcinogenic.

To date, the use of ethanol as an octane enhancer in both California and the Northeast has been limited due to lack of regional availability and readily available MTBE. As MTBE is phased out (and BBI believes it will be), ethanol is very likely to be the preferred product to substitute for MTBE. In addition, a series of lawsuits filed in numerous states against oil companies who have used MTBE (resulting in contaminated groundwater) has made many wary of its continued use.

The Senate version of the energy bill provides for a required ramp up of use of renewable fuels like ethanol. The bill if signed into law, would require 2.3 billion gallons in 2004 and gradually increases to 5 billion gallons in 2012. It is important to note that in addition to ethanol, other renewable fuels such as biodiesel are also included in the Senate Bill. Credit trading will impact renewable fuels use on the East and West coasts and a premium for the use of cellulosic ethanol may also impact the ethanol market.

The refining capacity in the United States continues to decline, while gasoline consumption continues to increase. The slightest upset in refining capacity (fire, shutdown, closure) sends gasoline prices soaring. U.S. refining capacity is not keeping pace with increasing demand. Ethanol plays a key role in helping refiners extend their product by as much as 10%.

The need for clean octane continues to grow in many parts of the country. Clean air standards will remain in place whether we have an oxygenate requirement in reformulated gasoline or not. Ethanol provides as much as three octane points to the gasoline into which it is blended. In addition to the octane, it helps refiners meet clean air requirements by reducing, through dilution, various toxic components in gasoline.

The ability of petroleum marketers to increase profits $0.01 per gallon of gasoline sold or more makes ethanol a solid business choice. So while it may take some time for a full switch to ethanol to occur, it is becoming increasingly apparent that in the next decade ethanol will be the octane enhancer, fuel extender and MTBE replacement in our gasoline.

Conclusions

Given the costs and performance for bioethanol plants described herein, production of fuel ethanol from corn stover would be very competitive with today's production from corn via dry milling. NREL expects the performance used in this feasibility study will be achieved in the next ten years or less, so this comparison is somewhat misleading. It is likely that ethanol production from corn will continue to improve in efficiency and yields during the next ten years also. High gravity fermentation, better enzymes and yeast, ethanol production from distillers grain and production of new high value co-products from corn are just a few of the dry mill technology improvements under investigation.

The technology for ethanol production from corn stover is where corn dry milling technology was 20 years ago. We expect cellulosic ethanol technology to improve rapidly and exceed the performance used in this report in less than ten years. Financing the first generation of bioethanol plants is the most challenging hurdle to overcome in the near-term.

Current projections for energy use provided by NREL are significantly higher than for a dry mill. This is one area where rapid improvements are likely if the bioethanol technology follows the path of the dry mill industry. Increasing the ethanol concentration in the beer would be a good the first step in this direction. The capital cost of dry mills has also decreased dramatically over the past decade. This is a second area for significant improvement in bioethanol technology.

Co-location provides significant benefits for ethanol production from corn stover, primarily by eliminating the costly lignin boiler. Lignin is not expected to generate significant revenue if its value is determined solely by the local cost of coal. The ethanol plant location can have a significant impact on the projected profitability. Low feedstock cost, low energy costs and other incentives such as a state producer payment can provide a significant advantage for a bioethanol plant. This is the primary advantage of the Nebraska site over the Indiana site.

Recommendations

BBI offers the following recommendations for NREL's consideration:

1. Continue development of the core technologies required to achieve the performance goals used in this feasibility study. Pretreatment, enzymes and fermentation are the obvious areas to focus on.

2. Conduct a feasibility study focused on identifying the best near-term opportunity for a commercial cellulosic ethanol plant. This study should have no restrictions on feedstock or location. The size of the proposed ethanol plant should be based on the availability of feedstock, infrastructure and equity/financing constraints. The sooner a biomass ethanol plant is up and running, the sooner the improvements in energy use, yields and capital costs will begin.

3. Identify the risks associated with the first generation of bioethanol plants (feedstock, technology and market risks) and develop a plan to mitigate those risks. Without this effort, financing the first plants will remain nearly unattainable.

II. SITE SELECTION

Co-location of bioethanol plants with coal-fired power plants may provide an opportunity for early deployment of bioethanol technologies. "Bioethanol" as used herein is defined as ethanol produced from lignocellulosic biomass and does not include ethanol produced from starch or sugar feedstocks.

Co-location with coal-fired power plants presents an opportunity to lower the capital cost of the bioethanol plant by eliminating the lignin-fired boiler included in most greenfield designs. The lignin-fired boiler can represent up to 30% of the bioethanol plant capital cost. Integration of the ethanol operations with the power plant could benefit both facilities (purchasing of steam from the power plant and sharing of overhead costs such as maintenance for example). Midwest locations are of interest to NREL and DOE because of the vast corn stover resource available for bioethanol and bioenergy production concentrated in the Midwest.

BBI has identified 10 potential sites for the project (Table 4). These sites are believed to encompass the majority of variables that will be encountered when co-locating bioethanol plants with coal-fired power plants in the Midwest. Sites at major electric generating stations have been identified as well as potential sites at smaller industrial sites with coal-fired boilers. Seven of the sites would use corn stover as the feedstock for ethanol production, one wheat straw, one rice straw and one spent brewers grain.

Table 4 – Candidate sites for bioethanol co-location study

1	Duck Creek Power Station, Canton, IL
2	Big Stone Power Plant, Milbank, SD
3	RM Schahfer Generating Station, Wheatfield, IN
4	Nebraska Public Power (new plant), Grand Island, NE
5	Nordic Energy Power Plant & Ethanol Plant, Northeast, OH
6	American Crystal Sugar Plant, Crookston, MN
7	Independence Power Plant, Newport, AR
8	Williams BioEnergy Ethanol Plant, Pekin, IL
9	Coors Brewery, Golden, CO
10	Tesoro Refinery, Mandan, ND

Two sites are to be selected for further study. The site selection criteria that will be used to narrow down the sites to the top two are shown in Table 5. A superior ethanol plant site encompasses many factors. Proximity of feedstocks, good road and rail access, utility availability and space for equipment and truck movement are necessary. Other considerations include a qualified and/or trainable labor force, as well as community facilities that are capable of attracting and retaining top management personnel who may come from outside the area. The site selection criteria used to screen the ten sites include the following general categories.

- Adequate biomass feedstock within a reasonable transportation distance
- Access to a large coal fired power plant
- Cost of coal (higher is better for the bioethanol plant lignin value)
- Existing or planned ethanol or agricultural processing facility at the site
- Infrastructure that may reduce the bioethanol plant cost (steam supply or wastewater treatment, for example)
- Access to good road and rail transportation
- Access to a local ethanol market
- Community services needed to support the ethanol plant
- Other advantages of the site

Each site selection criteria is assigned a maximum score that indicates the relative importance of that criterion when selecting an appropriate site for an ethanol plant. Each criterion is described below.

Table 5 – Site Selection Criteria

Site Selection Criteria	Points
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	8
Achieve 30-MMgal w/stover < 50 miles	4
Power Plant Size	
Coal Fired Power Plant > 800 MW	8
Coal Fired Power Plant > 400 MW	6
Coal Fired Power Plant > 200 MW	4
Relative Value of Lignin Fuel to Coal	8
Existing Ethanol Plant/Ag Facility	8
Planned Ethanol Facility	4
Low-cost Steam Available	8
Existing Wastewater Treatment	8
Mainline Rail	10
Two Mainline Rails	5
Shortline Rail	5
Interstate Road Access < 10 miles	5
Ethanol Market < 100 miles	10
Community Services < 10 miles	8
Other Advantages	10

Site Selection Criteria

Feedstock Proximity

Feedstock is a very important site selection criterion. Without adequate feedstock, you do not have a project. Agricultural residues such as corn stover and rice straw can be harvested and transported up to approximately 50 miles at a reasonable cost. The amount of biomass feedstock within 50-miles of each site will, therefore be estimated and the resulting ethanol production potential calculated. The 50-mile feedstock collection area is approximately equal in size to a USDA Agricultural District. The corn, wheat or rice production in the site's Agricultural District will be used to estimate the corresponding amount of biomass available. Each ton of corn, wheat or rice produced is assumed to result in 1.2 dry tons of biomass (corn stover, wheat straw or rice straw).

The ethanol production potential for the corn stover and wheat straw sites is based on using 25% of the corn stover or wheat straw produced within the Agricultural District at a yield of 70 gallons of ethanol per dry ton of biomass. For the Newport, Arkansas site 90% of the rice straw is assumed to be available for ethanol production at the same ethanol yield of 70 gallons per ton of rice straw.

For feedstock proximity, sites receive a score of 12 points if the ethanol production potential is greater than 70 million gallons per year (MMGPY), 8 points for 50 MMGPY and 4 points for 30 MMGPY. If the ethanol production potential for the site is less than 30 MMGPY, the site receives a score of zero points. If the ethanol production potential is too small (less than about 10 MMGPY), the site will not be considered for further study.

Coal Fired Power Plant Generation

The coal-fired power plant generation capacity is important because it will determine the relative impact of using lignin for a boiler fuel. Very large power plants could burn the lignin from a bioethanol plant with little impact on boiler operations. Potential sites at power plants larger than 800 megawatts (MW) receive 8 points with 6 and 4 points awarded for power plants larger then 400 and 200 MW, respectively. For sites co-located with plants smaller than 200 MW, zero points are awarded.

Relative Value of Lignin to Cost of Coal Fuel

For this project the lignin byproduct from bioethanol production is assumed to be sold to the power plant for fuel use. The price received for the lignin will be determined in part by the power plant's coal fuel cost. A higher cost for coal should result in a higher price for the lignin and a more profitable bioethanol plant. Other factors could impact the value of the lignin, however. For example, use of a renewable fuel or possible reduction of SOx or NOx emissions may increase the value of the lignin above its fuel value. These factors will be discussed with power plant personnel later in the project.

A maximum score of 8 points will be awarded to sites with a coal cost of $1.50 per MMBTU or higher. For sites with coal costs below $1.50/MMBTU, the score is calculated as the ratio of the local cost of coal (per million BTUs), divided by $1.50, times the maximum score of 8 points.

Existing and Planned Ethanol Plant/Ag Facility

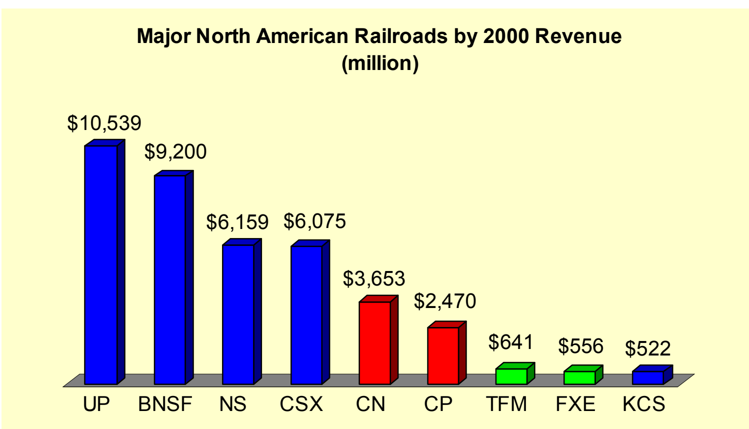
The presence of a corn ethanol plant or another agricultural processing facility at a co-location site may provide an advantage as a result of synergies with the existing facility. Sites with an existing ethanol or agricultural processing facility receive 8 points and sites with plans for future ethanol plants receive 4 points.

Utilities

Sites with low cost steam available receive 8 points and those with an existing wastewater treatment facility receive an additional 8 points. Low cost steam and an existing wastewater treatment plant would provide benefits through lower capital costs and possibility lower operating costs for the bioethanol facility. It is BBI's experience that most power plants do not have "excess" steam available for a co-located ethanol plant.

Transportation Infrastructure

Access to rail for shipping ethanol to more distant markets can provide a distinct advantage over ethanol plants without rail access. An existing rail siding at a proposed site as well as access to two rail lines are positive site attributes. A site on a mainline rail line is better than a location on a short line rail line. All of the proposed sites have a rail siding so a score for rail siding was not included in the site evaluation matrix. A site on a main line rail receives 10 points and if the site has access to two rail lines, then another 5 points is awarded. A site on a short line rail receives 5 points.



Class I or "mainline" railroads are line haul freight railroads with annual operating revenue in excess of $262 million. There are only nine Class I railroads operating in the U.S. (source: Association of American Railroads Policy & Economics Department).

Major North American Freight Railroads

UP Union Pacific Railroad
BNSF The Burlington Northern and Santa Fe Railway
NS Norfolk Southern
CSX CSX Transportation
CN Canadian National Railway
CP Canadian Pacific Railway

TFM TFM (a subsidiary of Grupo Transportación Ferroviaria Mexicana)
FXE Ferrocarril Mexicano (a subsidiary of Grupo Ferroviario Mexicano)
KCS Kansas City Southern Railway

Access to good roads is important to an ethanol plant because most, if not all, of the feedstock will be delivered by truck and ethanol may be shipped to local markets by truck. Sites within 10 miles of an interstate highway receive 4 points.

Ethanol Market

A large local ethanol market, such as Chicago or Denver, can provide a distinct advantage for an ethanol plant through lower shipping costs. A site within 100 miles of a large ethanol market receives 10 points.

Community Services

Community services within 10 miles of the ethanol plant site are important to provide quick response to the needs of the plant and to attract and retain top employees. Desirable community services include electrical maintenance, machine shop, welding, plumbing, hospital, airport, good schools and fire protection. Sites with all of the recommended community services available within 10 miles receive a score of 8 points (one point for each service listed here).

Other Advantages

Sites can receive up to 10 points for situations not covered by the above site evaluation criteria that may provide an economic advantage for the site. Examples include cooperatives formed to use corn stover (aligns with DOE's goals) or a power plant that already provides steam to an ethanol plant or other industrial user (shows willingness to look beyond just power generation and seek other business opportunities).

Site Evaluations and Scoring

Each of the ten sites and their respective site selection scores will be examined in the next sections of the report, followed by the site selection summary and recommendations.

Duck Creek Generation Plant

The Duck Creek Generation Plant in west central Illinois is owned and operated by AES Corporation. AES is a leading global power company comprised of competitive generation, distribution, and retail supply businesses in Argentina, Australia, Bangladesh, Brazil, Canada, Chile, China, Dominican Republic, El Salvador, Georgia, Hungary, India, Italy, Kazakhstan, the Netherlands, Mexico, Pakistan, Panama, the United Kingdom, the United States, and Venezuela.

AES's generating assets include interests in 173 facilities totaling over 59,000 megawatts of capacity in 27 countries. AES also distributes electricity in 9 countries through 19 distribution businesses. In addition, through its various retail electricity supply businesses, the company sells electricity to over 153,000 end-use customers.

The Duck Creek Generation Plant is a 440 MW coal fired power plant located about seven miles south of Canton, Illinois. AES owns about 9,000 acres of land at the site. The site is about 190 miles south of Chicago and an equal distance north of St. Louis. Canton has a population of about 15,000.

Bituminous coal is used in the coal-fired boilers at the Duck Creek Generation Plant. The average utility coal fuel cost in Illinois is $1.44 per million BTUs (source: Energy Information Administration/State Electricity Profiles. Illinois, November 2001).

Feedstock Proximity

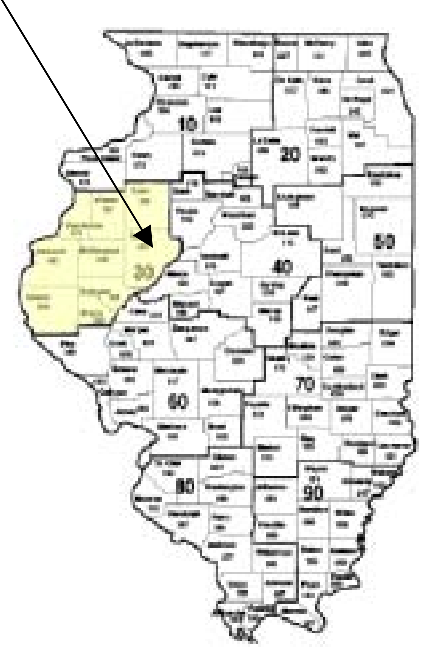
The Duck Creek Generation Plant is located in Illinois agricultural District 30 West – the yellow area on the Illinois map shown here.

Within District 30, corn production in 2000 was 164 million bushels. The average yield was 152 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 5.5 million tons.

At a conversion rate of 70 gallons of ethanol per dry ton of stover, the ethanol production potential in the District is 96 million gallons of ethanol annually. Only 25% of the available stover is assumed to be used for ethanol production.

The Duck Creek site can easily support 50 million gallons of annual ethanol production within 50 miles of the site. The site receives the maximum score of 12 for feedstock proximity.

Duck Creek Generation Plant



Power Plant Generating Capacity

The Duck Creek Generation Plant has a total nameplate generation capacity of 440 MW. The site receives a score of 6 points for generation over 400 MW.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in Illinois is $1.44 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The Duck Creek site receives a score of 1.44/1.50*8 = 7.7 points.

Existing and Planned Ethanol Plant/Ag Facility

There are no existing ethanol or agricultural processing facilities at the Duck Creek site. There is a 30 million gallon per year dry mill ethanol plant in the planning stages to be located less than one mile to the west of the Duck Creek plant. The Central Illinois Energy Cooperative has completed a feasibility study and business plan for the ethanol project and is now raising the equity and debt financing for the project. Central Illinois Energy Cooperative plans to purchase over 100 acres for the ethanol plant with plans for future value added agricultural processing at the site. The cooperative has expressed an interest in ethanol production from corn stover.

The site scores zero points for an existing ethanol or agricultural processing facility at the site and 4 points for the corn dry mill ethanol plant under development.

Utilities

Steam is not available from the Duck Creek power plant (Central Illinois Energy Cooperative Business Plan, BBI International, December 2001). An existing wastewater treatment facility is also not available. The site scores zero for both low cost steam and wastewater treatment.

Transportation

Coal is delivered to the Duck Creek power plant via a Burlington Northern rail line. The site scores 10 points for access to mainline rail. A second railroad is not available at the site.

The site has good road access via state highways, but the nearest interstate highway (Interstate 74) is 20 miles to the north. The site scores 0 points for access to an interstate highway less than 10 miles away.

Ethanol Market

The Chicago and St. Louis ethanol markets are nearly 200 miles from the Duck Creek site. The site score 0 points for access to a major ethanol market within 100 miles.

Community Services

All desired community services are available in Canton, Illinois, about 7 miles from the Duck Creek site. The site scores 8 points for community services.

Other Advantages

The Central Illinois Energy Cooperative is planning to build a 30 million gallon per year corn dry mill ethanol plant near the Duck Creek power plant, but points have already been awarded for the planned ethanol facility. There are no additional advantages to the site.

Duck Creek Site Score

The Duck Creek site scored 48 points. The strengths of the site are the abundance of corn stover in the area, mainline rail service and a relatively high cost of coal, which should result in a higher value for the bioethanol plant's lignin. A 30 MMGPY dry mill ethanol plant is being developed near the Duck Creek power plant.

The Duck Creek site suffers from a lack of nearby interstate highway access and the distance to the nearest major ethanol market. There is no steam or wastewater treatment available at the site.

Site Selection Criteria	**Duck Creek**
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	--
Coal Fired Power Plant > 400 MW	6
Coal Fired Power Plant > 200 MW	--
Relative Value of Lignin Fuel to Coal	7.7
Existing Ethanol Plant/Ag Facility	0
Planned Ethanol Facility	4
Low-cost Steam Available	0
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	0
Shortline Rail	0
Interstate Road Access < 10 miles	0
Ethanol Market < 100 miles	0
Community Services < 10 miles	8
Other Advantages	0
Total Points	**48**

Big Stone Power Plant

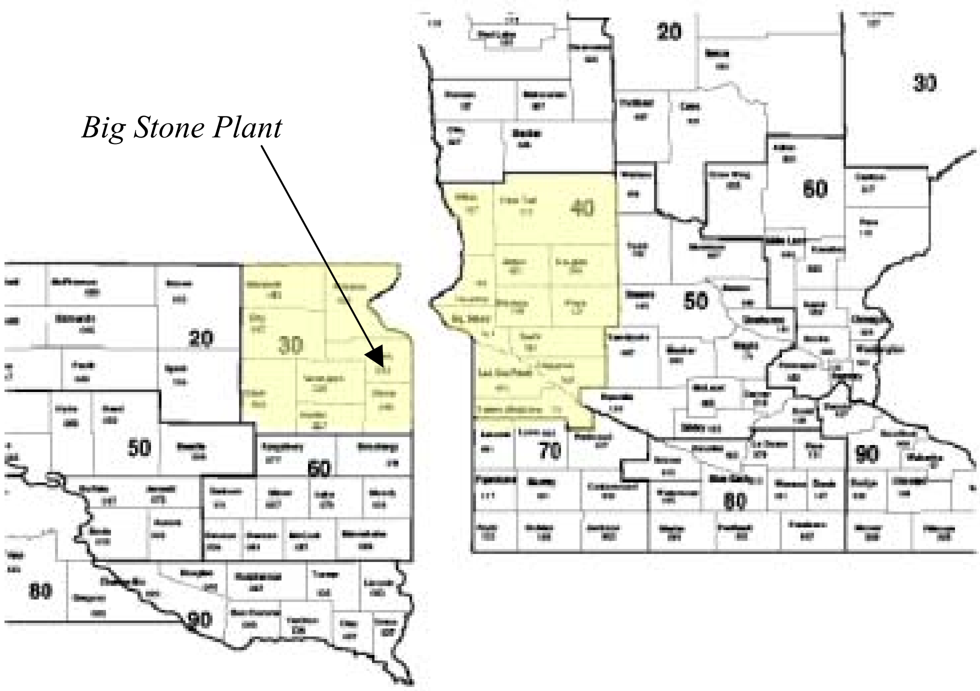
The Big Stone Power Plant near Milbank, South Dakota is co-owned and operated by Otter Tail Power Company. Otter Tail Power Company is a division of Otter Tail Corporation headquartered in Fergus Falls, Minnesota. Otter Tail Power Company owns over 650 megawatts of coal, hydro, and internal combustion generation and operates over 1,100 megawatts of generation in the upper Midwest.

The Big Stone facility is a 475 MW coal fired power plant located near Milbank, South Dakota. The site is in the northeast corner of the state and is about 180 miles due west of Minneapolis. Milbank has a population of about 5,000.

Bituminous coal is the fuel for the coal-fired boilers at the Big Stone Plant. The average utility coal fuel cost is \$0.94 per million BTUs in South Dakota (source: Energy Information Administration/State Electricity Profiles. South Dakota, November 2001).

<u>Feedstock Proximity</u>

The Big Stone Plant is located in South Dakota agricultural District 30 Northeast. The site is very near the Minnesota boarder so one-half of the feedstock area is assumed to be in South Dakota and one-half in Minnesota – see the yellow area on the map shown here.



South Dakota District 30 corn production in 2000 was 67 million bushels. The average yield was 126 bushels per acre. In Minnesota District 40, corn production in 2000 was 186 million bushels and the average yield was 146 bushels per acre. Using one-half of the corn production in South Dakota District 30 and one-half in Minnesota District 40, and 1.2 pounds of stover per pound of corn produced, the corn stover produced in the feedstock area is estimated to be 4.25 million tons.

At a conversion rate of 70 gallons of ethanol per ton of stover, the ethanol production potential for the Big Stone site is 74 million gallons of ethanol when only 25% of the stover is used for ethanol production.

The Big Stone site can easily support 50 million gallons of annual ethanol production within 50 miles of the site. The site receives the maximum score of 12 for feedstock proximity.

Power Plant Size

The Big Stone Plant has a total nameplate generation capacity of 475 MW, all of it coal fired. The site receives a score of 6 points for generation over 400 MW.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in South Dakota is $0.94 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The Big Stone site receives a score of 0.94/1.50*8 = 5 points.

Existing and Planned Ethanol Plant/Ag Facility

There is a corn dry mill ethanol plant under construction at the Big Stone Plant site. The Northern Lights Ethanol, LLC ethanol plant was designed by Broin and Associates and will produce 40 million gallons of ethanol annually from corn feedstock. Northern Lights has negotiated a contract to purchase steam from the Big Stone Power Plant. The ethanol plant will have its own natural gas fired boiler and has the option to produce its own steam whenever it is more economical than purchasing steam for the power plant. The Northern Lights ethanol plant is schedule to be in commercial operation by August 2002. The site scores 8 points for the Northern Lights ethanol plant at the site.

Utilities

The Big Stone plant will be providing about 100,000 pounds per hour (pph) of steam to the Northern Lights ethanol plant. This is equivalent to about 10 MW of power production or 2% of the 475 MW nameplate capacity. The ability of the power plant to provide additional steam to a bioethanol facility will require further study. For now it is assumed that the power plant could provide another 100,000 pph or more steam to another facility at the site. The site receives 8 points for the availability of low cost steam.

The Northern Lights ethanol plant will have a wastewater treatment system, but it is unlikely that it will have adequate capacity for a bioethanol plant. Expansion of the existing wastewater facility will be explored if the Big Stone site is selected for further study. The site score zero for wastewater treatment.

Transportation

Coal is delivered to the Big Stone power plant via a Burlington Northern rail line. The site scores 10 points for access to mainline rail. A second railroad at the site is not available.

The site has good road access via state highways, but the site is 22 miles to the east of Interstate 29. The site scores 0 points for access to an interstate highway less than 10 miles away.

Ethanol Market

The Minneapolis ethanol market is 180 miles to the east of the Big Stone site. The site scores 0 points for access to a major ethanol market within 100 miles.

Community Services

All desired community services are available in Milbank, South Dakota and the surrounding area. The site scores 8 points for community services.

Other Advantages

The Big Stone power plant will provide steam to the Northern Lights ethanol plant at a price that is believed to be competitive with steam produced from natural gas. This arrangement shows the willingness of Big Stone and Otter Tail Power Company to look at non-traditional sources of revenue from their generating units. Big Stone and Northern Lights have already addressed the issue of steam pricing and reliability. This will be important information for the project. The experience and information available from Big Stone and Northern Lights results in an additional 10 points for the Big Stone site.

Big Stone Site Score

The Big Stone site scored 67 points. The strengths of the site are the abundance of corn stover in the area, mainline rail service, the Northern Lights ethanol plant at the site, the availability of low cost steam, and the unique co-host arrangement between Big Stone and Northern Lights. This is the same arrangement that the current project seeks to evaluate.

The Big Stone site suffers from a lack of nearby interstate highway access and the distance to the nearest major ethanol market. There is no wastewater treatment available at the site.

Site Selection Criteria	**Big Stone**
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	--
Coal Fired Power Plant > 400 MW	6
Coal Fired Power Plant > 200 MW	--
Relative Value of Lignin Fuel to Coal	5.0
Existing Ethanol Plant/Ag Facility	8
Planned Ethanol Facility	0
Low-cost Steam Available	8
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	0
Shortline Rail	0
Interstate Road Access < 10 miles	0
Ethanol Market < 100 miles	0
Community Services < 10 miles	8
Other Advantages	10
Total Points	**67**

RM Schahfer Generating Station

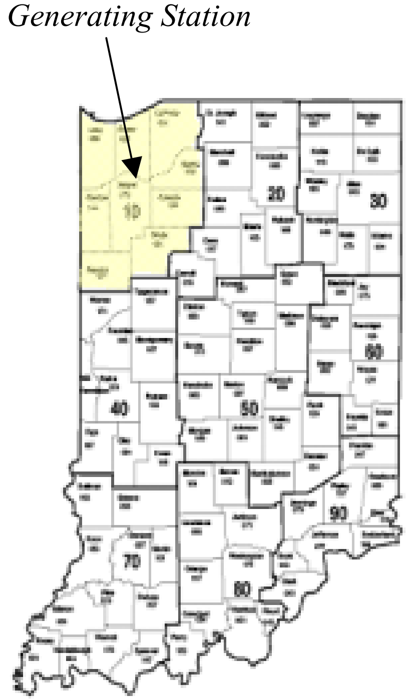
The Northern Indiana Public Service Company's RM Schahfer Generating Station is located on 2,800 acres just northeast of the community of Wheatfield in northwestern Indiana. The site is less than 100 miles from Chicago. Total nameplate capacity of the facility is 2,200 MW. There are several areas around the generation station that Northern Indiana Public Service Company (NIPSCO) would like to develop. Wheatfield is a town of about 620 population located at the intersection of State Highways 10 and 49.

The RM Schahfer generating station includes two 129 MW gas turbines, two approximately 550 MW coal fired boilers/steam turbines, and two 423 MW coal or natural gas fired boilers/steam turbines. Bituminous coal is used in the coal-fired boilers. The average coal fuel cost is $1.11 per million BTUs (source: Energy Information Administration/State Electricity Profiles. Indiana, November 2001).

The $70 million Georgia Pacific gypsum wallboard facility can be seen in the foreground of the above picture. NIPSCO is actively courting other large industrial operations to build facilities on the grounds of the 2,800-acre RM Schahfer generating station.

Feedstock Proximity

RM Schahfer Generating Station



The RM Schahfer Generating Station is located in Indiana agricultural District D10, Northwest – the yellow area on the Indiana map shown here.

Indiana District 10 contains about 4,000 square miles (55 miles wide by about 75 miles tall). This is equivalent to a 35-mile radius circle – a very reasonable feedstock collection distance.

Within District 10, corn production in 2000 was 125 million bushels. The average yield was 140 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 4.2 million tons in the District.

At a conversion rate of 70 gallons of ethanol per ton of stover, the ethanol production potential in the District is 73.5 million gallons of ethanol when only 25% of the stover is used. Use of 25% of the stover within the feedstock area is believed to be a conservative assumption for grower participation and stover collection and use.

The RM Schahfer generating station site can easily support 50 million gallons of annual ethanol production within 50 miles of the site. The site receives the maximum score of 12 for feedstock proximity.

Power Plant Generating Capacity

The RM Schahfer generating station has a total nameplate generation capacity of 2,200 MW. Of this 1,943 MW is coal fired. The site receives the maximum score for power plant generating capacity of 8 points.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in Indiana is $1.11 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The RM Schahfer site receives a score of 1.11/1.50*8 = 5.9 points.

Existing and Planned Ethanol Plant/Ag Facility

There are no existing or planned ethanol or agricultural processing facilities at the RM Schahfer site. There is a $70 million Georgia Pacific gypsum wallboard facility at the site. The Iroquois BioEnergy Cooperative plans to build an corn dry mill plant in the area, but it is likely to be located near Rensselaer, about 20 miles to the south. The site scores zero points for both existing and planned ethanol/ag facilities at the site.

Utilities

Steam is not available from the RM Schahfer power plants (Iroquois BioEnergy Cooperative Ethanol Feasibility Study, BBI International, December 2001). An existing wastewater treatment facility is also not available. The site score zero for both low cost steam and wastewater treatment.

Transportation

Coal is delivered to the RM Schahfer power plants via Norfolk Southern, the third largest railroad company in the country. The site scores 10 points for access to mainline rail.

The site has good road access with State Highway 49 directly to the west and State Highway 10 just a mile or two to the south. Interstate 65 is approximately 10 miles west of Wheatfield. The site scores 5 points for access to Interstate 65.

Ethanol Market

The Chicago area ethanol market, one of the largest in the country, is less than 100 miles from the RM Schahfer site. The site score 10 points for access to a major ethanol market within 100 miles.

Community Services

Community services within 10 miles of the RM Schahfer site include electrical maintenance, machine shop and welding, good schools and fire protection. Although there is not an industrial pipefitting and plumbing service within 10 miles of the site, the power plant has demonstrated that these services are available when needed. The site lacks a hospital and airport within 10 miles. The site scores 6 points for community services.

Other Advantages

There is a well organized farmers' cooperative in the area that is planning to build a 40 million gallon per year corn dry mill ethanol plant near Rensselaer, IN. The Iroquois BioEnergy Cooperative (IBEC) was originally formed to promote the use of corn stover in the area for ethanol production. When plans to build a corn stover ethanol plant did not meet the cooperative's timeline, the cooperative switched to a traditional dry mill ethanol plant that could be built relatively quickly. The cooperative is still interested in using corn stover and has recently received a $3 million appropriation for a bioenergy project. The RM Schahfer site receives 5 points for the activities of the Iroquois BioEnergy Cooperative.

The Georgia Pacific facility at the site uses fly ash from the power plant to manufacture gypsum wallboard. The Georgia Pacific facility presents the opportunity to sell gypsum from the bioethanol plant to the wallboard facility. The specifications for the required gypsum quality are not known at this time, however. The quality of the gypsum produced by the ethanol plant is also not well established and may not meet the required quality specifications. The Georgia Pacific facility represents a unique opportunity to reduce solid waste disposal cost and possibly create a new revenue stream for the bioethanol plant. An addition 5 points are awarded for the wallboard facility.

RM Schahfer Site Score

The RM Schahfer site scored 67 points. The strengths of the site are the abundant corn stover, the size of the power plants, excellent road and rail access and its proximity to the Chicago ethanol market. There is also an active farmers' cooperative in the area that is interested in ethanol production from corn stover.

The Georgia Pacific wallboard facility located at the RM Schahfer site uses gypsum in the manufacture of wallboard. The bioethanol plant will produce gypsum that is normally treated as a solid waste stream resulting in increased operating costs. The Georgia Pacific facility represents a potential market for the bioethanol plant's gypsum byproduct and may improve the viability of bioethanol production at the RM Schahfer site.

The site received no points for an existing or planned agricultural facility at the site and there is no steam or wastewater treatment available at the site.

Site Selection Criteria	**RM Schahfer**
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	8
Coal Fired Power Plant > 400 MW	--
Coal Fired Power Plant > 200 MW	--
Relative Value of Lignin Fuel to Coal	5.9
Existing Ethanol Plant/Ag Facility	0
Planned Ethanol Facility	0
Low-cost Steam Available	0
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	0
Shortline Rail	0
Interstate Road Access < 10 miles	5
Ethanol Market < 100 miles	10
Community Services < 10 miles	6
Other Advantages	10
Total Points	**67**

Nebraska Public Power District

Nebraska Public Power District (NPPD) is actively seeking a steam co-host, especially a large ethanol plant, for a new coal fired power plant to be built near Grand Island, Nebraska. Selecting NPPD's Grand Island site would provide an opportunity to evaluate co-location opportunities from "the ground up" and to maximize the synergies between the two facilities. NPPD plans to build a power plant in the 400 to 600 MW range.

Nebraska Public Power District is Nebraska's largest electric utility, with a chartered territory including all or parts of 91 of Nebraska's 93 counties. NPPD is a public corporation and political subdivision of the state of Nebraska. The utility is governed by an 11-member Board of Directors, who are popularly elected from NPPD's chartered territory.

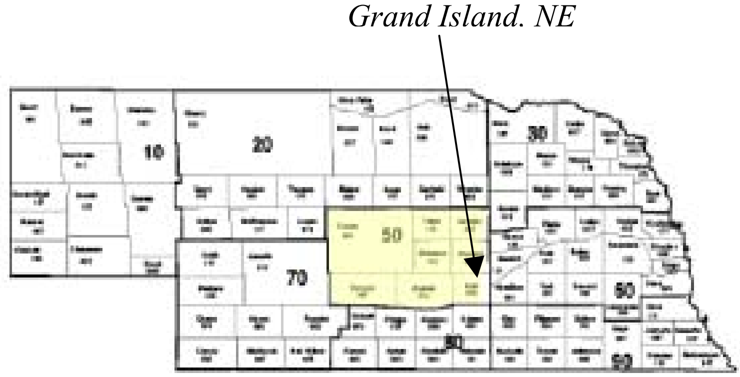
NPPD's revenue is mainly derived from wholesale power supply agreements with 55 towns and 25 rural public power districts and rural cooperatives who rely totally or partially on NPPD's electrical system. By the end of 2000, NPPD will also serve about 75 communities at the retail level. About 5,000 miles of transmission lines make up the NPPD electrical grid system, which delivers power to about one million Nebraskans.

NPPD uses a mix of generating facilities to meet the needs of its customers. This includes a nuclear plant, three steam plants (Canaday, GGS and Sheldon), nine hydro facilities, nine diesel plants and three peaking units. NPPD also purchases electricity from the Western Area Power Administration, which is operated by the federal government. The average mix of fuel to supply NPPD's customers in a typical year is 60 percent from coal, 20 percent from nuclear, 20 percent from hydro and 0.1 percent from gas or oil. Nebraska's electric rates are well below the national average (3.57¢/kWh for industrial customers).

<u>Feedstock Proximity</u>

The Grand Island site is located in Nebraska agricultural District 50 Central – the yellow area on the Nebraska map shown here.

Within District 50, corn production in 2000 was 145 million bushels. The average yield was 138 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 4.9 million tons.



At a conversion rate of 70 gallons of ethanol per dry ton of stover, the ethanol production potential in the District is 85 million gallons of ethanol annually. Only 25% of the available stover is assumed to be used for ethanol production.

The Grand Island site can easily support 50 million gallons of annual ethanol production within 50 miles of the site. The site receives the maximum score of 12 for feedstock proximity.

Power Plant Generating Capacity

Nebraska Public Power District plans to build a 400 to 600 MW coal fired power plant near Grand Island, NE. The site receives a score of 6 points for generation over 400 MW.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in Nebraska is $0.55 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The Grand Island site receives a score of 0.55/1.50*8 = 2.9 points.

Existing and Planned Ethanol Plant/Ag Facility

There are no existing ethanol or agricultural processing facilities at the Grand Island site. The site scores zero points for both existing and planned ethanol or agricultural processing facility at the site.

Utilities

Low cost steam would be available form the new co-generation power plant. Nebraska has the lowest cost coal of all the sites in the study and would, presumably, be able to provide steam at a very competitive price. Nebraska also has the lowest industrial electricity price of all the sites in the study. The Grand Island site scores 8 points for low cost steam.

An existing wastewater treatment facility is not available. The site scores zero for wastewater treatment.

Transportation

Both the Union Pacific Railroad & BNSF Railroads serve Grand Island. The site scores 10 points for access to mainline rail and 5 points for access to a second rail line.

Serving Grand Island directly are Interstate 80, U.S. Highways 30, 34 and 281 and Nebraska Highway 2, with key lateral connections to U.S. Highway 6 and Nebraska Highways 92, 14 and 11. No other community in the state of Nebraska can offer this network of highways to all points in the state. The site scores 5 points for access to an interstate highway less than 10 miles away.

Ethanol Market

There are no large ethanol markets within 100 miles of Grand Island. The site score 0 points for access to a major ethanol market within 100 miles.

Community Services

All desired community services are available in Grand Island, a city of over 40,000 population. The site scores 8 points for community services.

Other Advantages

Very low electricity rates in Nebraska will make the ethanol plant more competitive. Combined with the anticipated low steam cost, the bioethanol facility energy costs should be very low. Designing two new facilities should result in the maximum synergies and lowest costs for each facility. Issues related to the use of lignin fuel could be addressed in the power plant design rather than in a retrofit. The Grand Island site receives 5 additional points for these advantages.

Grand Island Site Score

The Grand Island site scored 62 points. The strengths of the site are the abundance of corn stover in the area, two mainline rail companies and low energy costs.

The Grand Island site is obviously contingent upon the plans of Nebraska Public Power to build a co-generation power plant at the site. It does afford the opportunity to evaluate the integration of ethanol with a new coal fired power plant.

Site Selection Criteria	**Grand Island**
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	--
Coal Fired Power Plant > 400 MW	6
Coal Fired Power Plant > 200 MW	--
Relative Value of Lignin Fuel to Coal	2.9
Existing Ethanol Plant/Ag Facility	0
Planned Ethanol Facility	0
Low-cost Steam Available	8
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	5
Shortline Rail	0
Interstate Road Access < 10 miles	5
Ethanol Market < 100 miles	0
Community Services < 10 miles	8
Other Advantages	5
Total Points	**62**

Nordic Energy Power Plant

Like the Grand Island site, the Nordic Energy power plant is a new coal fired power plant scheduled for start of construction by 2003. Nordic Energy, a Michigan power company, recently announced plans for an 850 MW coal fired power plant in Ashtabula Township in Northeast Ohio. Nordic Energy also plans to build an ethanol plant on the same site and use excess steam from the power plant for the ethanol plant. Construction of the ethanol plant, which will produce 80 million gallons a year, is expected to begin in 2002 and be in operation by 2003.

Nordic Electric is one of the largest retail power marketers in the Midwest.

<u>Feedstock Proximity</u>

The Nordic Energy site is located in Ohio agricultural District 30 Northeast – the yellow area on the Ohio map shown here.

Nordic Energy site

Within District 30, corn production in 2000 was 21 million bushels. The average yield was 130 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 700,000 tons.

At a conversion rate of 70 gallons of ethanol per dry ton of stover, the ethanol production potential in the District is 12 million gallons of ethanol annually. Only 25% of the available stover is assumed to be used for ethanol production.

The Nordic Energy site cannot support a reasonable sized bioethanol plant due to the low corn production in the area. The site will not be considered further in this study. The lack of feedstock cannot be compensated for by other site attributes.

American Crystal Sugar

The American Crystal Sugar site is west of the American Crystal Sugar plant located just outside of Crookston, MN. Crookston is about 25 miles southeast of Grand Forks, ND. The American Crystal Sugar plant has three 100,000 pph boilers and two are now idle due to process and plant efficiency improvements. The boilers are coal fired.

The American Crystal Sugar site presents many possible opportunities to integrate a bioethanol facility with the existing sugar beet plant. The beet plant has rail siding, a wastewater treatment facility, electrical substation, and maintenance and administrative facilities.

The bioethanol plant could also represent a new market for Crystal Sugars' off spec sugar, hard molasses and beet pulp. At the right price, these materials could supplement the ethanol plant's normal feedstock and reduce operating expenses.

American Crystal Sugar is a cooperative owned by 2,300 farmers throughout northwest Minnesota and eastern North Dakota. They grow, harvest and process sugarbeets, producing 10 percent of the U.S. sugar supply. American Crystal Sugar operates five sugarbeet processing plants in the Red River Valley. American Crystal's activities have an annual economic impact of $1.1 billion in Minnesota and eastern North Dakota communities.

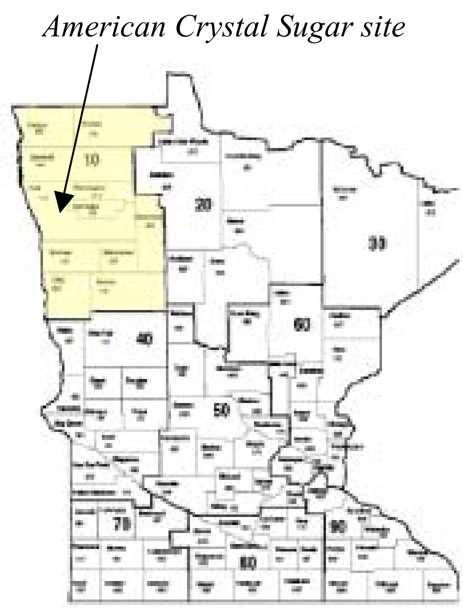
<u>Feedstock Proximity</u>

The American Crystal Sugar site is located in Minnesota agricultural District 10 Northwest – the yellow area on the Minnesota map shown here.

Within District 10, corn production in 2000 was 14 million bushels. The average yield was 100 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 470,000 tons.

At a conversion rate of 70 gallons of ethanol per dry ton of stover, the ethanol production potential in the District is 8 million gallons of ethanol annually. Only 25% of the available stover is assumed to be used for ethanol production.

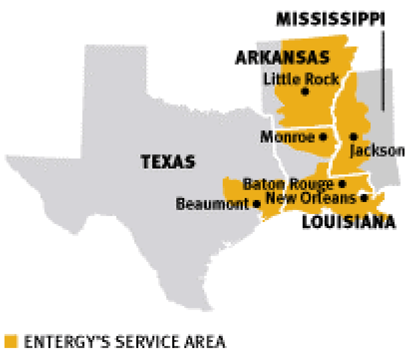
The American Crystal Sugar site cannot support a reasonable sized bioethanol plant and will not be considered further in this study.



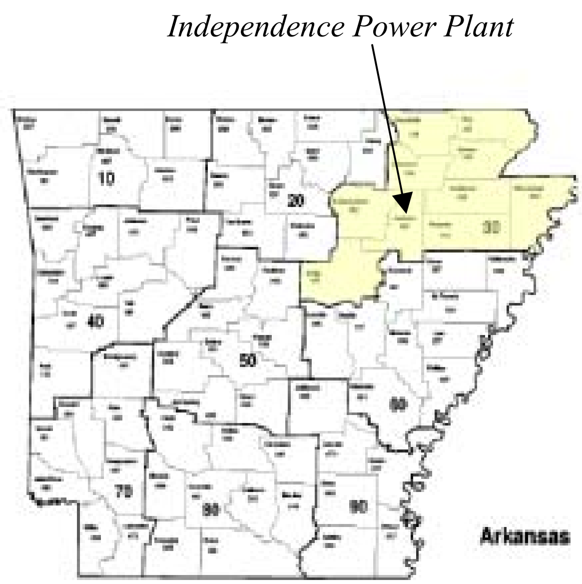
Independence Power Plant

The Entergy Independence Power Plant is located on 1,800 acres near the town of Newport, Arkansas. The site is about 80 miles west of Memphis, TN. Total nameplate capacity of the facility is 1,700 MW with two 850 MW coal-fired boilers and steam turbines. Newport, in northeast Arkansas, is a major rice growing region of the state. Rice straw would be the biomass feedstock at this site. Newport has a population of 7,500.

Entergy Corporation, headquartered in New Orleans, Louisiana is a major global energy company engaged in power production, distribution operations, and related diversified services, with more than 15,000 employees.



Entergy owns, manages, or invests in power plants generating more than 30,000 MW of electricity domestically and internationally, and delivers electricity to about 2.6 million customers in portions of Arkansas, Louisiana, Mississippi, and Texas. Entergy ranks among the largest U.S. utility companies with total 2000 revenues of $10 billion, $25.5 billion in 2000 assets and more than 30,000 megawatts of plant generation capability.



Feedstock Proximity

The Independence Power Plant is located in Arkansas agricultural District 30, Northeast – the yellow area on the Arkansas map shown here.

Within District 30, rice production in 2000 was 65 million bushels (56 pounds per bushel). The average yield was 110 bushels per acre. At 1.2 pounds of rice straw per pound of rice produced, the rice straw produced is estimated to be 2.2 million tons.

At a conversion rate of 70 gallons of ethanol per ton of rice straw, the ethanol production potential in the District is 138 million gallons of ethanol when 90% of the rice straw is used.

The Independence Power Plant site can support 138 million gallons of annual ethanol production within about 50 miles of the site. The site receives a score of 12 for feedstock proximity.

Power Plant Generating Capacity

The Independence Power Plant has a total nameplate generation capacity of 1,700 MW. The site receives the maximum score for power plant generating capacity of 8 points.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in Arkansas is $1.46 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The Independence Power Plant site receives a score of 1.46/1.50*8 = 7.8 points.

Existing and Planned Ethanol Plant/Ag Facility

There are no existing or planned ethanol or agricultural processing facilities at the Independence Power Plant site. The site scores zero points for both existing and planned ethanol or agricultural facilities at the site.

Utilities

The availability of steam from the power plant is unknown at this time and would require further investigation by Independence Power Plant personnel. An existing wastewater treatment facility is also not available. The site score zero for both low cost steam and wastewater treatment.

Transportation

Coal is delivered to the Independence Power Plant power plants via Union Pacific Railroad. The site scores 10 points for access to mainline rail.

The site has good road access via state highways and the site is within 10 miles of Interstate 30. The site scores 5 points for access to Interstate 30.

Ethanol Market

There are no large ethanol markets within 100 miles of the Independence Power Plant site. The site score zero points for access to a major ethanol market within 100 miles.

Community Services

All desired community services are available within 10 miles of the Independence Power Plant. The site scores 8 points for community services.

Other Advantages

There are no “other” advantages of the Independence Power Plant site.

Independence Power Plant Site Score

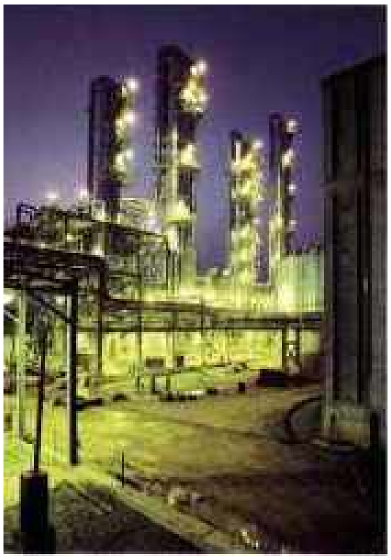
The Independence Power Plant site scored 51 points. The strengths of the site are the significant amount of rice straw available, the size of the power plants, excellent road and rail access and a relatively high fuel cost.

There are no existing or planned agricultural facilities at the site and there is no steam or wastewater treatment available at the site.

Site Selection Criteria	Independence
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	8
Coal Fired Power Plant > 400 MW	--
Coal Fired Power Plant > 200 MW	--
Relative Value of Lignin Fuel to Coal	7.8
Existing Ethanol Plant/Ag Facility	0
Planned Ethanol Facility	0
Low-cost Steam Available	0
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	0
Shortline Rail	0
Interstate Road Access < 10 miles	5
Ethanol Market < 100 miles	0
Community Services < 10 miles	8
Other Advantages	0
Total Points	**51**

Williams Bio-Energy Ethanol Plant

Williams Bio-Energy is the second largest producer and marketer of ethanol in the U.S. Its Pekin, Illinois wet mill facility produces approximately 100 million gallons of ethanol annually. Williams also is a majority owner of the 30 MMGPY Nebraska Energy dry mill ethanol plant in Aurora, NE. Through marketing agreements with other ethanol plants, Williams markets close to 400 million gallons of ethanol each year.



The Williams Bio-Energy plant in Pekin has its own coal-fired co-generation power plant. There are two stoker type coal fired boilers that each produce 150,000 pph of steam and a third fluidized bed boiler produces 280,000 pph of steam. Total steam production is equivalent to about 60 MW of power, although most of the steam is used for process heating in the ethanol plant rather than for electricity production. The co-generation plant has two turbine generator sets rated at 7.5 MW each. Williams produces about two-thirds of its electricity needs.

Pekin is located just south of Peoria in central Illinois. Pekin has a population of about 33,000 and is 170 miles southwest of Chicago.

The average utility coal fuel cost is \$1.44 per million BTUs in Illinois (source: Energy Information Administration/State Electricity Profiles. November 2001).

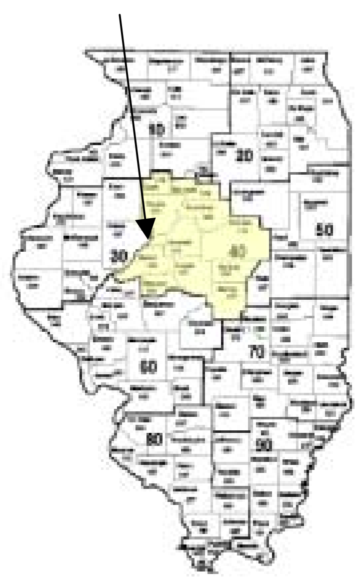
<u>Feedstock Proximity</u>

The Williams Bio-Energy Pekin plant is located in Illinois agricultural District 40 Central – see the yellow area on the map shown here.

Illinois District 40 corn production in 2000 was 243 million bushels. The average yield was 159 bushels per acre. Using 1.2 pounds of stover per pound of corn produced, the corn stover produced in the feedstock area is estimated to be 8.2 million tons.

At a conversion rate of 70 gallons of ethanol per ton of stover, the ethanol production potential for the Williams Bio-Energy Pekin site is 143 million gallons of ethanol when only 25% of the stover is used for ethanol production.

Williams Bio-Energy



The Williams Bio-Energy Pekin site can easily support 50 million gallons of annual ethanol production within 50 miles of the site. The site receives the maximum score of 12 for feedstock proximity.

Power Plant Size

The Williams Bio-Energy Pekin plant produces 15 MW of electrical power and about 45 MW of equivalent steam power for process heating needs within the ethanol plant. The site receives a score of 0 points because the generation capacity is under 200 MW.

Relative Value of Lignin Fuel to Coal

The average cost of coal to utility power plants in Illinois is $1.44 per million BTUs (source: Energy Information Administration/State Electricity Profiles). The Williams Bio-Energy Pekin site receives a score of 1.44/1.50*8 = 7.7 points.

Existing and Planned Ethanol Plant/Ag Facility

There is a 100 MMGPY corn wet mill ethanol plant at the Pekin site. The site scores 8 points for the existing ethanol plant at the site.

Utilities

The Williams Bio-Energy Pekin plant provides its own process steam, but excess steam is not available. The site receives zero points for the availability of low cost steam.

The Williams Bio-Energy Pekin ethanol plant has a wastewater treatment system, but it is unlikely that it will have adequate capacity for a large bioethanol plant. The site score zero for wastewater treatment.

Transportation

Coal is delivered to the Williams Bio-Energy Pekin plant via a Burlington Northern rail line. The site scores 10 points for access to mainline rail. A second railroad at the site is not available.

The site has good road access via several state highways and Interstate 474. The site scores 5 points for access to an interstate highway less than 10 miles away.

Ethanol Market

The Chicago ethanol market is 170 miles to the north and the St. Louis market is about the same distance to the south. The site score 0 points for access to a major ethanol market within 100 miles.

Community Services

All desired community services are available in Milbank, South Dakota and the surrounding area. The site scores 8 points for community services.

Other Advantages

Williams Bio-Energy is actively involved in the development of bioethanol production from corn gluten feed; an animal feed byproduct of the wet mill process. The Williams Bio-Energy site receives 5 points for Williams' interest in ethanol production from biomass.

Williams Bio-Energy Site Score

The Williams Bio-Energy site scored 56 points. The strengths of the site are the highest concentration of corn stover of all the sites evaluated, mainline rail service, a relative high cost of coal, and the wet mill and co-generation plant at the site.

The Williams Bio-Energy site suffers from a small capacity of the co-generation plant, no excess steam or wastewater treatment capacity and the nearest major ethanol market is also over 100 miles away.

Site Selection Criteria	**Williams**
Feedstock Proximity	
Achieve 70-MMgal w/stover < 50 miles	12
Achieve 50-MMgal w/stover < 50 miles	--
Achieve 30-MMgal w/stover < 50 miles	--
Power Plant Size	
Coal Fired Power Plant > 800 MW	--
Coal Fired Power Plant > 400 MW	--
Coal Fired Power Plant > 200 MW	0
Relative Value of Lignin Fuel to Coal	7.7
Existing Ethanol Plant/Ag Facility	8
Planned Ethanol Facility	0
Low-cost Steam Available	0
Existing Wastewater Treatment	0
Mainline Rail	10
Two Mainline Rails	0
Shortline Rail	0
Interstate Road Access < 10 miles	5
Ethanol Market < 100 miles	0
Community Services < 10 miles	8
Other Advantages	5
Total Points	**56**

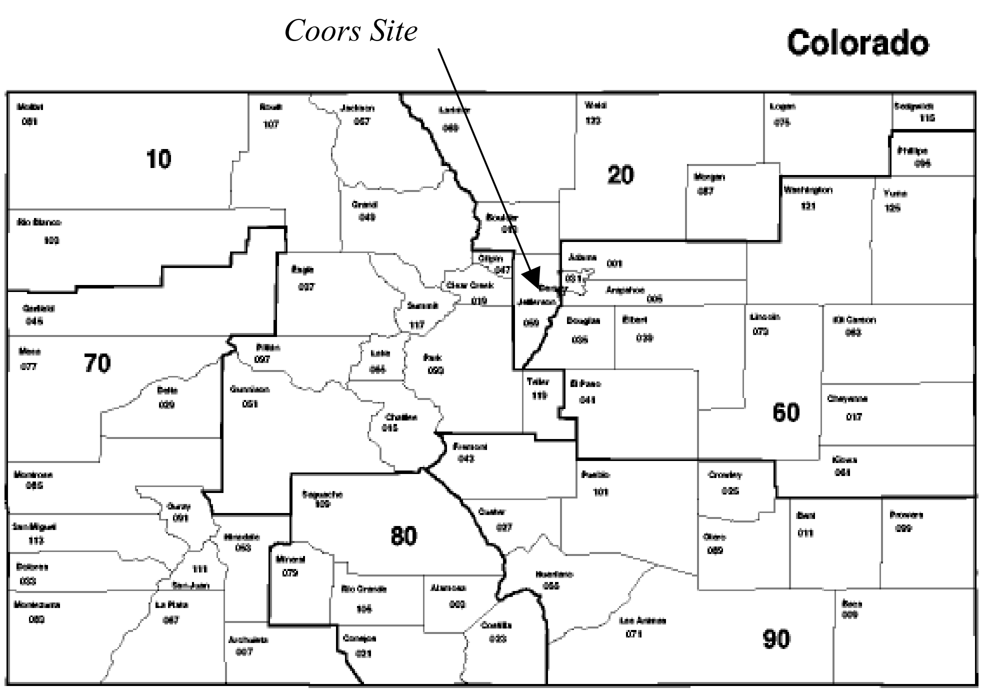
Coors Brewery

The Coors Brewery located in Golden, Colorado, is the largest brewery (on a single site) in the world producing about 20 million barrels of beer annually. The facility also produces about 75,000 tons of spent brewers grain that could be converted to ethanol with cellulosic technologies. The Coors Brewery has a 35 MW coal-fired co-generation plant that provides steam and electricity to the brewery. The brewery also has a large wastewater treatment system and an existing fuel ethanol distillation system that produces about 1 million gallons of ethanol annually.

<u>Feedstock Proximity</u>

The Coors Brewery site is located in an urban area with limited access to local agricultural residues. There is a significant amount of corn produced in eastern Colorado (about 150 million bushels annually), but the transportation distance and cost would be prohibitive to bring corn stover to the Coors site. The ethanol potential using the brewery's spent brewers grain is only about 5 million gallons per year.

The Coors Brewery site cannot support a reasonable sized bioethanol plant (10 MMGPY and larger) and will not be considered further in this study.



Tesoro Refinery

The Tesoro Refinery site is located in Mandan, North Dakota. Mandan is just west of Bismarck on Interstate 94 in south central North Dakota. The refinery has its own 8 MW power plant, with low cost steam available, and a dedicated pipeline to Minneapolis that can be used to ship ethanol/gasoline blends to the Minneapolis market at a very low cost.

Feedstock Proximity

The Tesoro Refinery site is located in North Dakota agricultural District 80 Central – the yellow area on the North Dakota map shown below. Wheat is the primary crop in the area, but some corn is also grown in the district.

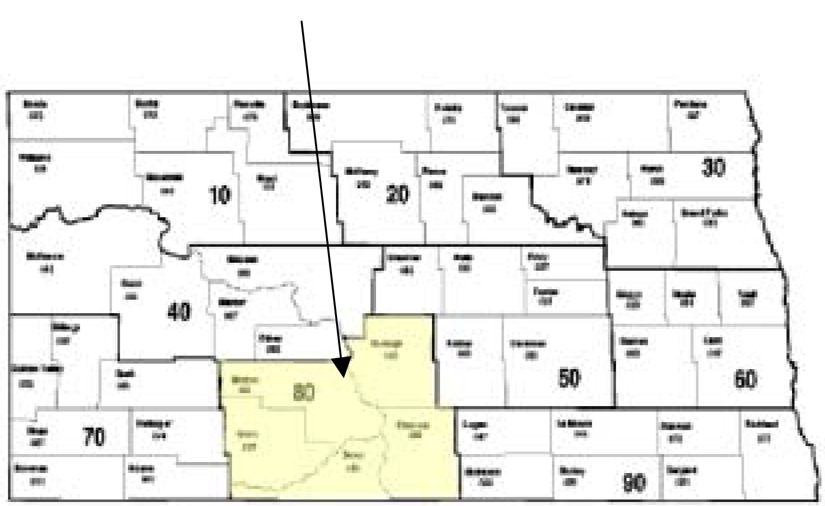
Within District 80, corn production in 2000 was 4.2 million bushels. The average yield was 96 bushels per acre. At 1.2 pounds of stover per pound of corn produced, the corn stover produced is estimated to be 141,000 tons.

Wheat production in District 80 was 20.6 million bushels in 2000. The average yield was 33 bushels per acre (a bushel of wheat weights 60 pounds). At 1.2 pounds of wheat straw per pound of wheat produced, the wheat straw produced is estimated to be 743,000 tons.

At a conversion rate of 70 gallons of ethanol per dry ton of corn stover and wheat straw, the ethanol production potential in the District is 2.5 million gallons of ethanol from corn stover and 13 million gallons from wheat straw. Only 25% of the available stover and wheat straw is assumed to be used for ethanol production.

The Tesoro Refinery site cannot support a reasonable sized bioethanol plant and will not be considered further in this study. The lack of feedstock cannot be compensated for by other site attributes.

Tesoro Refinery site



Preliminary Screening Results

The initial scoring and analysis of the sites presented in the previous sections of this report resulted in the following site ranking:

Table 6 – Preliminary site evalaution scoring summary

	Site Ranking	Site Score
1	Big Stone Power Plant, Milbank, SD	67
1	RM Schahfer Generating Station, Wheatfield, IN	67
3	Nebraska Public Power (new plant), Grand Island, NE	62
4	Williams BioEnergy Ethanol Plant, Pekin, IL	56
5	Independence Power Plant, Newport, AR	51
6	Duck Creek Power Station, Canton, IL	48
	Inadequate Feedstock for a Large Ethanol Plant:	
7	Coors Brewery, Golden, CO	66
8	Nordic Energy Power Plant & Ethanol Plant, Northeast, OH	60
9	American Crystal Sugar Plant, Crookston, MN	48
10	Tesoro Refinery, Mandan, ND	45

The Big Stone Power Plant site in Milbank, South Dakota and the RM Schahfer Generating Station in Wheatfield, IN had the highest scores with 67 points each. The next highest score was the Coors Brewery with 66 points, but this site was eliminated from further consideration because the ethanol production potential at the site is only about 5 million gallons per year; much too small to meet the goals of this study.

The proposed coal fired power plant in Grand Island, Nebraska had the next highest scores with 62 points. This is a planned coal fired power plant and presents the opportunity to study integration issues and synergies with a new coal fired power plant rather than an existing plant.

The Big Stone Power Plant, RM Schahfer Generating Station and Nebraska Public Power sites were all felt to be excellent sites for the co-location study with each bringing something different to the project. To narrow the final selection down to the required two study sites, additional information as described below was gathered for the top three sites.

Additional Site Information

Three additional site evaluation criteria were used to select the final two sites from the three top sites. The new criteria are:

- The power plant's willingness to work with BBI and NREL on the project
- Availability of state ethanol incentives that may make bioethanol more commercially viable in the near-term

- Remaining life of the power plant

The results for these three criteria are shown in the following table for the Big Stone Power Plant, RM Schahfer Generating Station and Nebraska Public Power sites.

Table 7 – Additional site screening criteria

	Big Stone Power Plant	**RM Schahfer Generating Station**	**Nebraska Public Power District**
Location	Milbank, SD	Wheatfield, IN	Grand Island, NE
Willing to work with us?	Broin – yes. Big Stone less than enthusiastic	Yes. Northern Indiana Power Company has an active program to bring industry to the site	Yes. Very interested in a large ethanol plant co-host
State Incentives?	Yes. 20¢/gal state producer payment of up to $1 million/year with $10 million lifetime cap per plant Plus 2¢/gal state gasoline excise tax exemption for E10	No state producer payment or state excise tax exemption for ethanol.	Yes. 18¢/gal state producer payment for new plants. Limited to 15.6 million gallons annually or $2.808 million/year for 8 years If too many plants are built, the state may not have enough funds to fully fund all payments per above formula
Remaining power plant life? (based on a 45-year plant life)	Year Commissioned & Years Remaining 1975 – 475 MW 18 years	Year Commissioned & Years Remaining 1976 – 540 MW 19 years 1979 – 556 MW 22 years 1983 – 424 MW 26 years 1986 – 424 MW 29 years	New power plant. Expected life would be 45 years

The revised site scoring is shown in the following table. The Nebraska Public Power District site now has the highest score with 89 points. Nebraska Public Power has expressed a strong interest to work on the project, Nebraska has a very generous state producer payment for ethanol plants and the remaining life of the power plant would far exceed the design life of the ethanol plant.

RM Schahfer Generating Station has the second highest score with 87 points. The power plant and a local biomass (corn stover) cooperative have expressed a strong interest to work on the project and the remaining life of the power station exceeds the design life of the ethanol plant. Indiana currently does not have state incentives for ethanol use.

The Big Stone Power Plant in South Dakota is ranked third with reduced scores for all three criteria. Big Stone management did not respond to inquiries about their willingness to work on the project, South Dakota does have state incentives for ethanol production, but only scored three points (out of ten) because of the amount of payments – approximately $10 million over the life of the project in South Dakota versus $22 million in Nebraska and $30 million in Minnesota.

Table 8 – Revised site scoring for the top three sites

	Possible Points	Big Stone Power Plant	RM Schahfer Generating Station	Nebraska Public Power District
Previous Site Score		67	67	62
Additional Site Information				
Willing to work with us	10	5	10	10
State Incentives for Ethanol (note 1)	10	3	0	7
Remaining Power Plant Life (note 2)	10	6.5	10	10
Revised Site Score		**82**	**87**	**89**

Notes:

(1) Up to 10 points are awarded for state producer payments totaling $30 million (MN program). South Dakota provides $10 million so Big Stone receives 10/30*10 points = 3 points. Nebraska provides $22.5 million so NPPD receives 22.5/30*10 = 7 points.

(2) 10 points are awarded if the remaining power plant life is greater than the ethanol plant life (assumed to be 20 years). The ethanol plant is assumed to be built 5 years from now, so 5 years are subtracted from the current remaining life of the power plant. Remaining life for Big Stone is 18 years so its score is (18-5)/20*10 points = 6.5 points.

Summary and Recommendations

Ten sites were evaluated to determine which two sites would be the best sites for co-location of a bioethanol plant with an existing coal-fired power plant or coal-fired industrial boiler. Corn stover is the preferred feedstock, but rice straw, wheat straw and spent brewers grain feedstocks were also considered. The amount of feedstock available must be able to support a reasonable size bioethanol plant – 30 million gallons per year or larger. Smaller plants would not likely support DOE's long-term goals for bioethanol production and industry growth.

The Big Stone Power Plant, RM Schahfer Generating Station and Nebraska Public Power sites scored the highest in the preliminary site screening while also meeting the project's minimum feedstock and ethanol plant size criteria. These three sites were felt to be excellent sites for the co-location study with each bringing something different to the project. To narrow the final selection down to the required two study sites, additional information about the top three sites was collected and new site scores determined.

The top two sites are the Nebraska Public Power District site in Grand Island, NE and the RM Schahfer Generating Station in Wheatfield, IN. BBI recommends and NREL has concurred that the study sites will be the Nebraska and Indiana sites.

Feasibility Study for Bioethanol Co-Location with a Coal Fired Power Plant					NREL Subcontract # ACO-2-31092-01					March 20, 2002	
BBI International		1	2	3	4	5	6	7	8	9	10
Site Information		Duck Creek Power Station, Canton, IL	Big Stone Power Plant, Milbank, SD	RM Schahfer Generating Station, Wheatfield, IN	Nebraska Public Power, Grand Island, NE	Nordic Energy Power Plant & Ethanol Plant Northeast, OH	American Crystal Sugar Plant in Crookston, MN	Independence Power Plant in Newport, AR	Williams BioEnergy Ethanol Plant in Pekin, IL	Coors Brewery, Golden, CO	Tesoro Refinery in Mandan, ND
Power Plant Capacity, MW		440 MW	475	2200 MW	400-600 MW	850 MW	36 (equiv) MW	842 MW		35 MW	8 MW gas fired
Average Utility Fuel Cost ($/MMBTU)		$1.44	$0.94	$1.11	$0.55	$1.36	$1.10	$1.46	$1.44	$0.98	$0.73
Average Industrial Electric Rate (¢/kWh)		5.02¢	4.55¢	3.89¢	3.57¢	4.33¢	4.56¢	4.12¢	5.02¢	4.38¢	4.04¢
Biomass Feedstock		Corn Stover	Corn Stover	Corn Stover	Corn Stover	Corn Stover	Corn Stover	Rice Straw	Corn Stover	Spent Grain	Corn Stover
USDA Agricultural District		D30 West	½ SD, ½ MN	D10 N. West	D50 Central	D30 N. East	D10 N. West	D30 Northeast	D40 Central	NA	D80 South
Bushels of Corn per acre in Ag District		152	136	140	138	130	100	6152 lb/acre	159	NA	96
Bushels of Corn Produced (56 lb/bushel)		164,000,000	126,500,000	125,000,000	145,000,000	21,500,000	14,000,000	65,357,143	243,000,000	NA	4,200,000
Tons of Biomass Produced		5,510,400	4,250,400	4,200,000	4,872,000	722,400	470,400	2,196,000	8,164,800	75,000	141,120
Ethanol Potential from 25% of Corn Stover or 80% of Rice Straw		96,432,000	74,382,000	73,500,000	85,260,000	12,642,000	8,232,000	138,348,000	142,884,000	5,250,000	2,469,600
Site Selection Criteria	**Points**										
Feedstock Proximity											
Achieve 70-MMgal w/stover < 50 miles	12	12	12	12	12	--	--	12	12	--	--
Achieve 50-MMgal w/stover < 50 miles	8	--	--	--	--	--	--	--	--	--	--
Achieve 30-MMgal w/stover < 50 miles	4	--	--	--	--	0	0	--	--	0	0
Power Plant Size											
Coal Fired Power Plant > 800 MW	8	--	--	8	--	8	--	8	--	--	--
Coal Fired Power Plant > 400 MW	6	6	6	--	6	--	--	--	--	--	--
Coal Fired Power Plant > 200 MW	4	--	--	--	--	--	0	--	0	0	0
Relative Value of Lignin Fuel to Coal	8	7.7	5.0	5.9	2.9	7.3	5.9	7.8	7.7	5.2	3.9
Existing Ethanol Plant/Ag Facility	8	0	8	0	0	0	8	0	8	8	0
Planned Ethanol Facility	4	4	0	0	0	4	0	0	0	4	0
Low-cost Steam Available	8	0	8	0	8	8	8	0	0	8	8
Existing Wastewater Treatment	8	0	0	0	0	0	8	0	0	8	0
Mainline Rail	10	10	10	10	10	10	10	10	10	10	10
Two Mainline Rails	5	0	0	0	5	0	0	0	0	0	0
Shortline Rail	5	0	0	0	0	0	0	0	0	0	0
Interstate Road Access < 10 miles	5	0	0	5	5	5	0	5	5	5	5
Ethanol Market < 100 miles	10	0	0	10	0	10	0	0	0	10	10
Community Services < 10 miles	8	8	8	6	8	8	8	8	8	8	8
Other Advantages	10	0	10	10	5	0	0	0	5	0	0
Total Points		**48**	**67**	**67**	**62**	**60**	**48**	**51**	**56**	**66**	**45**
Additional Site Information											
Willing to work on the project	10		5	10	10						
State Incentives for Ethanol	10		3	0	7						
Remaining Power Plant Life	10		6.5	10	10						
Revised Site Score			**82**	**87**	**89**						

III. FEEDSTOCK SUPPLY

Corn is the largest crop grown in the United States and it follows that corn stover is the most abundant crop residue available for conversion to ethanol. Corn stover is not harvested on a large scale, however and estimates of its availability and cost vary widely. The long-term impacts of harvesting corn stover are also not well known. The lack of an ongoing, large scale corn stover harvesting, storage and delivery operation will be a serious issue for lenders that developers of a large bioethanol project must address.

Estimates of corn stover availability vary widely depending on the assumption about what fraction of stover can be collected in a sustainable manner. Some residue is required to be left in the field for protection against water and wind erosion of the soil. The amount is dependent on many factors including tillage practice, topography (especially the slope and extent of sloped land), soil type and crop rotation. Current planning for projects requiring corn stover harvest is based on a general assumption of leaving about half the stover in the field. Soil scientists suggest that, on average, this would be sufficient to maintain a high level of protection from soil erosion.

The project sites selected for evaluation (see Task 2) were selected in part due to the large amount of corn stover available within a relatively short distance from the sites. Other biomass feedstocks are available in the area, but none are of sufficient quantity to impact the viability of the proposed bioethanol plants. Mixing feedstocks would also introduce unneeded risk and complexity into the project at this time. We will, therefore limit our feedstock analysis to corn stover only. The feedstock supply analysis will examine the following issues for each site:

- Corn stover supply
- Delivered cost of corn stover
- Potential ethanol yield from corn stover
- Potential for the production of co-products
- Possible competition for corn stover

Corn Stover Production and Availability

Glassner et al. (1999) estimated that 200 million annual dry tons of corn stover is available and 20-60% can be sustainably harvested. Wyman and Hinman (1990) state that 58% of corn stover can be harvested on a sustainable basis. However, with current equipment and no-till farming, 76%-82% can be harvested, although 70% is the limit for commercial balers (Glassner et al. 1998). Based on these assumptions, Glassner et al. estimated the corn stover availability in the U.S. to be 153 million dry tons per year. This estimate is high because it assumes that all acreage is planted using no-till farming techniques. Kadam (2000) concludes that about 100 million dry tons per year of corn stover is available on a sustainable basis in the Midwest.

The two project sites to be evaluated for bioethanol production are near Wheatfield, Indiana and Grand Island, Nebraska. Nebraska and Indiana were the number three and four corn producing states in the U.S. in 2001 (USDA National Agricultural Statistics Service). Corn stover production is typically equal to the weight of corn produced, i.e. a ton of corn will yield a ton of corn stover. Farms with high corn yields (greater than 150 bushels per acre) may bring down the ratio to 0.9, while lower yields can result in a ratio of 1.1.

Corn yields within 50 miles of the project site in Nebraska averaged 148 bushels per acre from 1996 through 2001. Within 50 miles of the project site in Indiana, the average yield for the past five years was 136 bushels per acre. A ratio of 1.0 will be used for the corn stover production estimates. The annual corn stover production shown in Table 9 is based on a ratio of one ton of stover produced (above ground) per ton of corn harvested.

Table 9 – Top corn producing states in the U.S.

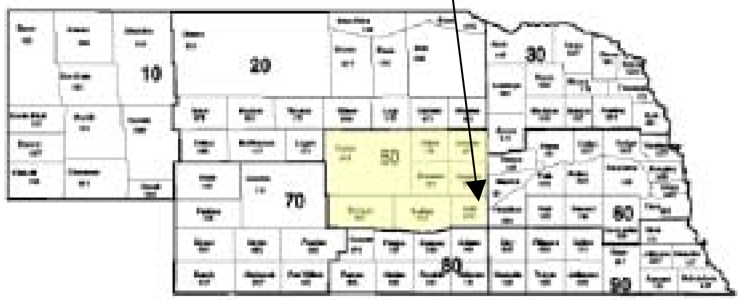
State	Corn Production (bushels/year)	Stover Production (tons/year) [1]
Iowa	1,664,400,000	46,603,200
Illinois	1,649,200,000	46,177,600
Nebraska	**1,014,300,000**	**28,400,400**
Indiana	**884,520,000**	**24,766,560**
Minnesota	806,000,000	22,568,000

1) Stover production is assumed to be equal to the weight of corn produced. Stover units are short tons (2001 USDA data)

The amount of corn stover that can be harvested on a sustainable basis is conservatively estimated by Walsh et al (2000) at 16.0 million annual tons for Nebraska and 11.2 million tons for Indiana. These quantities are the total quantities that can be collected after taking into consideration quantities that must be left to maintain soil quality (i.e., maintain organic matter and prevent erosion). From the stover production estimates in Table 9 and the sustainable amount of stover available per Walsh et al, we can surmise that 56% of the stover can be collected in Nebraska (16/28.4*100) and 45% of the stover produced in Indiana could be collected on a sustain able basis.

We will now estimate the amount of corn stover available on a sustainable basis near the project sites in Nebraska and Indiana. The study sites, shown in the maps below, are near Wheatfield, Indiana and Grand Island, Nebraska.

Grand Island. NE Site



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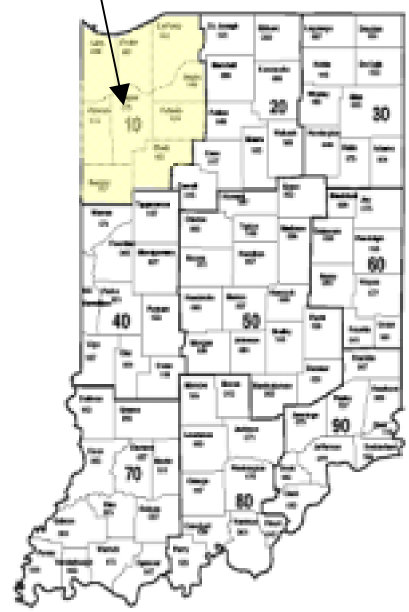
Wheatfield. IN Site



Local Corn Stover Production

Corn stover production near the project sites will average annual corn production within 50 miles of th then applying the ratios discussed in the previous sect ton of corn produced and 56% of the stover available and 45% available in Indiana.

50-mile radius maps for each site are shown below an stover available in the counties within 50 miles of t Table 11.

Figure 1 – 50-mile feedstock area for Wheatfield, IN site

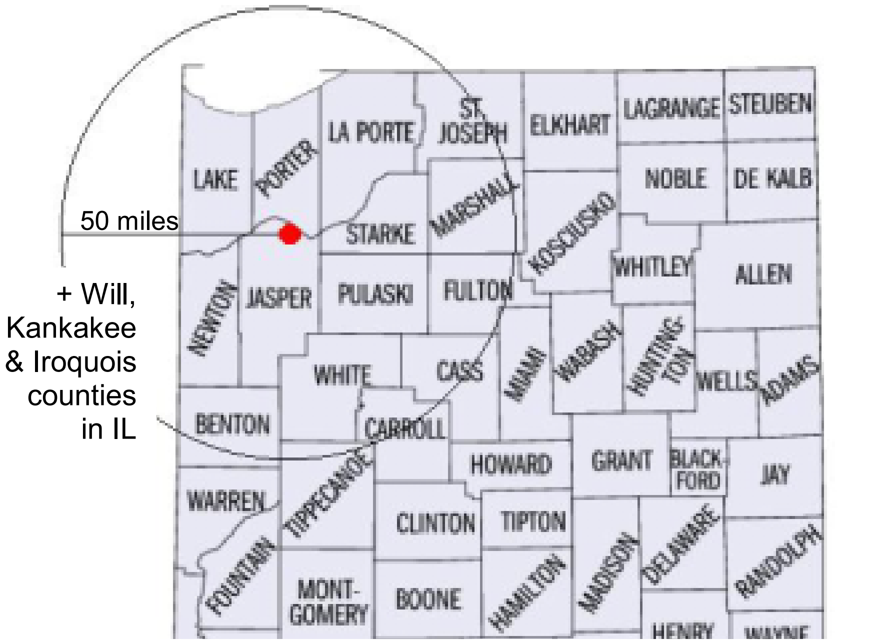


Table 10 – Annual corn and corn stover production, Wheatfield, IN Site

County	Corn Production (bushels/year)	Stover Production (tons/year)	Stover Available (tons/year)
Benton	17,270,200	483,566	217,605
Fulton	10,767,267	301,483	135,668
Jasper	20,293,567	568,220	255,699
La Porte	15,381,383	430,679	193,805
Lake	8,862,400	248,147	111,666
Marshall	11,615,583	325,236	146,356
Newton	15,163,350	424,574	191,058
Porter	8,643,650	242,022	108,910
Pulaski	14,234,733	398,573	179,358
Starke	7,604,650	212,930	95,819
White	19,594,067	548,634	246,885
Indiana Total	**149,430,850**	**4,184,064**	**1,882,829**
Iroquois	44,809,333	1,254,661	564,598
Kankakee	24,957,167	698,801	314,460
Will	15,798,483	442,358	199,061
Illinois Total	**85,564,983**	**2,395,820**	**1,078,119**
IN + IL Total	**234,995,833**	**6,579,883**	**2,960,948**

Figure 2 – 50-mile feedstock area for Grand Island, NE site

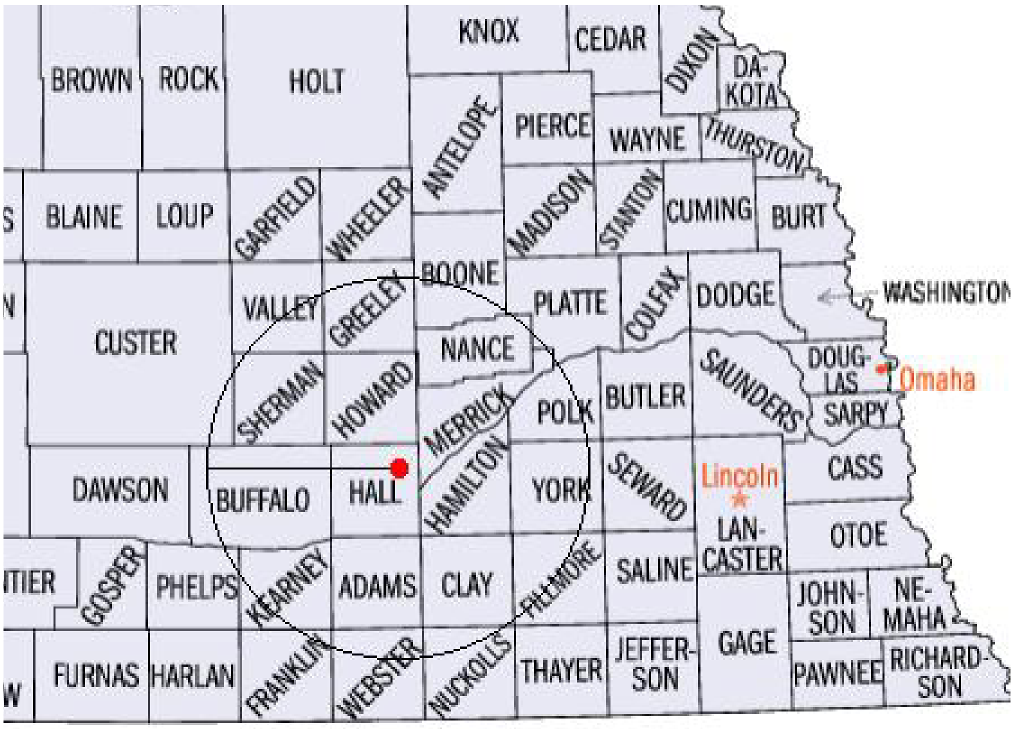


Table 11 – Annual corn and corn stover production, Grand Island, NE Site

County	Corn Production (bushels/year)	Stover Production (tons/year)	Stover Available (tons/year)
Adams	27,520,283	770,568	431,518
Buffalo	30,190,167	845,325	473,382
Clay	23,552,733	659,477	369,307
Greeley	8,914,800	249,614	139,784
Hall	29,928,417	837,996	469,278
Hamilton	35,578,283	996,192	557,867
Howard	14,049,450	393,385	220,295
Kearney	29,452,167	824,661	461,810
Nance	10,078,533	282,199	158,031
Polk	19,470,017	545,160	305,290
Sherman	9,317,867	260,900	146,104
York	35,085,400	982,391	550,139
Total	**273,138,117**	**7,647,867**	**4,282,806**

Note: Corn production is the average annual production from 1996 through 2001.
ton = short ton or 2,000 lbs

The estimated amount of corn stover available on a sustainable basis within 50 miles of the Wheatfield, Indiana site is nearly 3 million tons per year (45% of the estimated annual corn stover production). The 50-mile radius includes eleven Indiana counties and three counties to the west in Illinois as shown in Table 10.

The estimated amount of corn stover available on a sustainable basis within 50 miles of the Grand Island, Nebraska site is 4.3 million tons per year (56% of the estimated annual corn stover production). The 50-mile radius includes twelve counties surrounding Grand Island as shown in Table 11.

Ethanol Production Potential

The amount of ethanol that could be produced from the available stover within 50 miles of each site is shown in Table 12 and Table 13. Ethanol yields of 70, 80 and 90 gallons per bone dry ton (BDT) of stover were used to determine the ethanol production potential due to the uncertainty of the ethanol yield from a commercial bioethanol plant using corn stover feedstock.

Table 12 – Annual ethanol production potential for Wheatfield, IN site

County	Stover Available (tons/year)	Ethanol Potential @ 70 gal/BDT	Ethanol Potential @ 80 gal/BDT	Ethanol Potential @ 90 gal/BDT
Benton	217,605	12,795,146	14,623,024	16,450,902
Fulton	135,668	7,977,253	9,116,860	10,256,468
Jasper	255,699	15,035,098	17,182,969	19,330,840
La Porte	193,805	11,395,759	13,023,725	14,651,691
Lake	111,666	6,565,975	7,503,971	8,441,968
Marshall	146,356	8,605,753	9,835,147	11,064,540
Newton	191,058	11,234,223	12,839,112	14,444,001
Porter	108,910	6,403,907	7,318,751	8,233,595
Pulaski	179,358	10,546,229	12,052,833	13,559,438
Starke	95,819	5,634,133	6,439,009	7,243,885
White	246,885	14,516,852	16,590,688	18,664,524
Indiana Total	**1,882,829**	**110,710,328**	**126,526,089**	**142,341,850**
Iroquois	564,598	33,198,339	37,940,959	42,683,579
Kankakee	314,460	18,490,266	21,131,732	23,773,199
Will	199,061	11,704,780	13,376,892	15,049,003
Illinois Total	**1,078,119**	**63,393,385**	**72,449,583**	**81,505,781**
IN + IL Total	**2,960,948**	**174,103,713**	**198,975,672**	**223,847,631**

Note: corn stover moisture is assumed to be 16%

Table 13 – Annual ethanol production potential for Grand Island, NE site

County	Stover Available (tons/year)	Ethanol Potential @ 70 gal/BDT	Ethanol Potential @ 80 gal/BDT	Ethanol Potential @ 80 gal/BDT
Adams	431,518	25,373,261	28,998,012	32,622,764
Buffalo	473,382	27,834,851	31,811,258	35,787,665
Clay	369,307	21,715,243	24,817,421	27,919,599
Greeley	139,784	8,219,303	9,393,489	10,567,675
Hall	469,278	27,593,521	31,535,453	35,477,385
Hamilton	557,867	32,802,608	37,488,695	42,174,782
Howard	220,295	12,953,368	14,803,849	16,654,330
Kearney	461,810	27,154,426	31,033,630	34,912,834
Nance	158,031	9,292,246	10,619,710	11,947,174
Polk	305,290	17,951,044	20,515,479	23,079,914
Sherman	146,104	8,590,924	9,818,199	11,045,474
York	550,139	32,348,177	36,969,346	41,590,514
Total	**4,282,806**	**251,828,973**	**287,804,541**	**323,780,109**

Note: corn stover moisture is assumed to be 16%

The ethanol production potential based solely on the previous calculations of the amount of corn stover that can be sustainably collected within 50 miles of each site is approximately 174 million gallons per year for the Indiana site with a 70 gallon per BDT ethanol yield and nearly 224 million gallons per year with a 90 gallon per BDT yield. For the Nebraska site the corresponding ethanol production potentials are 252 and 324 million gallons of ethanol each year.

Corn Stover Price

Like in the corn ethanol industry, corn stover is likely to be the single largest variable operating cost for a corn stover-to-ethanol plant. The percentage of total variable costs will be lower because corn stover should be priced much lower than corn. Until a large-scale corn stover operation is implemented and operated for several years, corn stover pricing is somewhat speculative, however.

Harvesting corn stover efficiently will require overcoming several challenges. Among other things, corn stover on the ground is inherently contaminated with dirt and other foreign materials; climatic and soil conditions may not allow timely field drying of stover for safe storage; and corn stover collection may compete with other crop harvesting operations. Efforts are underway to identify the most efficient ways of harvesting, drying, and transporting stover from the field to bioethanol facilities. With present practices and machinery, corn stover would likely be collected and baled separately, immediately after the corn grain harvest. Stover bales would then be stored and transported to ethanol plants in a manner similar to current handling of forage crops. As stover harvest becomes common, however, new equipment *and new farming practices* might allow grain and stover to be harvested simultaneously.

Walsh et al (2000) describes the method of estimating the cost of collecting agricultural residues using an engineering approach. For each harvest operation, an equipment complement is defined and using typical engineering specifications, the time per acre required to complete each operation and the cost per hour of using each piece of equipment is calculated. For corn stover, the analysis assumes one mow, one rake, one bale with a large round baler, and pickup, transport, and unloading of the bales at the side of the field where they are stored until transport to the user facility. The operations assumed are conservative – mowing might be eliminated and the raking operation is also eliminated in some circumstances. The method used by Walsh to estimate corn stover collection costs is consistent with that used by USDA to estimate the costs of producing agricultural crops. Walsh estimates that nearly 90% of all corn stover available in the U.S. can be delivered for a price between \$30 and \$40 per dry ton.

Currently, several companies purchase corn stover to produce bedding, insulating materials, particle board, paper, and chemicals. These firms typically pay \$10 to \$15 per dry ton to farmers to compensate for any lost nutrient or environmental impacts that result from harvesting corn stover. The premium paid to farmers depends, in part, on transportation distance with farmers whose fields are at greater distances from the user facility receiving lower payments. Studies have estimated that the cost of transporting giant round bales of switchgrass are \$5 to \$10 per dry ton for haul distances of less than 50 miles (Bhat et al, 1992; Graham et al, 1996; Noon et al, 1996). Corn stover bales are of similar size, weight, and density as switchgrass bales, and a similar transportation cost is assumed. For a more detailed explanation of the methodology used to estimate agricultural residue prices, see Walsh et al, 1998.

Site specific feedstock costs were estimated by comparing the corn density near the proposed project sites and adjusting the estimated bailing and transportation costs for the corn stover density. Baling cost per acre is \$19.64 for corn stover according to estimates by the Nebraska Cooperative Extension. The cost includes moving the bales to the edge of the field where they may be stored until needed at the ethanol plant. Alternatively, the bales may be moved from the field edge to a satellite or central storage area.

Storage of bales at the edge of the field results in the lowest storage cost as no extra loading and unloading is required. Storage at the ethanol facility would also result in lower storage costs, but more land will be required. Storage at a satellite storage area would result in the highest storage cost because the bales would have to be unloaded and then loaded at the satellite facility. BBI estimates the cost of storage from a low of zero at the edge of the field (there may be a "cost" due to bale degradation, however) to a high of \$10 per ton at a remote satellite facility where additional bail handling is required. We have assumed a cost of \$5 per ton for storage of corn stover bales.

Average corn yields per acre within 50 miles of the sites from 1996 through 2001 was 148 bushels per acre in Nebraska and 136 bushels per acre in Indiana (USDA data). Using the percent of stover available on a sustainable basis estimated earlier (56% in Nebraska and 45% in Indiana) results in 2.32 tons per acre of stover collected at the Nebraska site and 1.71 tons per acre at the Indiana site.

Corn stover is expected to be harvested immediately following the corn harvest. Custom harvesters are expected to do most of the bailing and corn stover transportation. Stover bale weight will impact transportation costs with more dense bales desirable. We have assumed large round bales will be produced with an average weight of 1,200 pounds each. Transportation is envisioned to be similar to the Harlan, Iowa corn stover project where 17 bales per truck were transported to a central storage area. The Nebraska Cooperative Extension estimates stover transportation costs to be $2.50 per mile per load for a minimum of 10 miles.

The average transportation distance to supply 2,000 BDT of stover per day to a bioethanol plant is 20 miles for the Nebraska site and 24 miles for the Indiana site. In calculating the average transportation distance we have assumed that only half of the corn acres are available for corn stover collection and the corn stover is collected from the remaining acres closest to the plant.

And finally, the Nebraska Cooperative Extension estimates the value of the soil nutrients removed from the field at $9.59 per ton of stover removed. We have assumed a payment to growers of $10 per ton.

The costs of harvesting, storage and delivering corn stover to the two project sites are summarized in Table 14.

Table 14 – Corn stover harvesting and deliver costs

	Grand Island, NE	Wheatfield, IN
Corn yield per acre (bu)	148	136
Stover yield per acre (tons/acre)	4.144	3.808
% Stover baled	56%	45%
Stover collection per acre (tons/acre)	2.32	1.71
Stover bale weight (lbs.)	1,200	1,200
Bales per truck	17	17
Tons stover per truck (tons/truck)	10.2	10.2
Stover transportation cost per mile ($/mile)	$2.50	$2.50
Stover transportation cost/mile/ton ($/mile/ton)	$0.245	$0.245
Baling and moving bales off field ($/acre)	$19.64	$19.64
Baling and moving bales off field ($/ton)	**$8.46**	**$11.46**
Average transportation distance (miles)	20.3	24.4
Transportation cost ($/ton)	**$4.98**	**$5.98**
Stover storage cost ($/ton)	**$5.00**	**$5.00**
Payment to growers ($/ton)	**$10.00**	**$10.00**
Total delivered cost ($/ton)	**$28.44**	**$32.44**
Corn stover moisture (%)	16%	16%
Total delivered cost - dry basis ($/BDT)	**$33.86**	**$38.62**

The estimated cost to deliver corn stover to the Grand Island, Nebraska site is $33.86 per BDT, and the estimated cost at the Wheatfield, Indiana site is $38.62. The lower corn yield per acre in Indiana and the requirement to leave more corn stover in the field, results in higher bailing costs per ton of stover and the stover must be collected over a greater distance resulting in higher transportation costs for Indiana.

Initially the price for corn stover could be higher, but it is believed by many that the delivered cost will come down as the practice of corn stover collection becomes more efficient. Corn stover prices from $25 to $45 per delivered BDT will be evaluated in the financial section of this report.

Competition for Corn Stover

Sources of competition for corn stover that could potentially create significant increased demand and drive up the price for corn stover are nonexistent in the project areas. There is so much corn stover available in these areas that increased prices due to competition are difficult to envision. Pulp and paper production and electricity are perhaps the only two existing markets that could create a sizable demand for corn stover. The production of certain commodity chemicals from corn stover could also create a large local demand. All of these applications using corn stover feedstock are conceptual at this time and predicting the impact on local corn stover pricing would be highly speculative.

Competition for corn stover will be avoided in the same manner as in the current corn ethanol industry: ethanol plants are not sited near other ethanol plants where they will create a large increase in the local corn price. This is not good business for the ethanol plant. It is well known that creating a large local demand for corn will drive up the local price of corn so project developers look for sites with a large excess of corn. Plants that use corn stover will not be located next to other users of corn stover because both business will suffer due to higher corn stover prices. Lenders usually will not fund the “second” project within a limited distance of another project that uses the same feedstock when other sites without local feedstock competition are available.

The bioethanol plant itself will create the greatest risk related to feedstock competition. Unless the bioethanol plant has a secondary or backup feedstock, it will be 100% dependant on corn stover supply and the plant may find itself at the mercy of the feedstock suppliers and corn growers. This will be a key issue for lenders. Long-term contracts for the corn stover can help to mitigate this risk, but contracts can be broken. Another option that would help would be for the owners of the corn stover, i.e. farmers, to have a majority ownership of the bioethanol facility. It would then be in their best interest to make sure the plant always had an adequate supply of corn stover at a reasonable price.

Finally the only other possible source of serious competition for corn stover would be the loss of corn acreage to another crop or another use. Conversion of #2 yellow corn to silage is one example. Silage requires the removal of the most of the corn plant and there would be little stover available. The National Corn Growers Association is predicting an increase in the number of corn acres in the future, however, driven primarily by the demand for fuel ethanol so this is not a likely scenario.

Potential for Co-Products

When using the dilute acid pretreatment/enzymatic hydrolysis process for producing ethanol from corn stover, the potential co-products include lignin residue, gypsum and carbon dioxide. Production of other co-products would require potentially major process changes to the basic process under development by NREL and used for this study. Production of co-products such as pulp, furfural and other products has been evaluated extensively by NREL and others and are beyond the scope of this study.

The quality and heating value of the lignin residue will impact is value and desirability as a boiler fuel. For example, if the residue contains significant amounts of sulfur (from the dilute acid pretreatment of corn stover), its value may be diminished as a boiler fuel. An alternative use for the lignin residue may be a fertilizer for local fields. The value of the lignin residue as fertilizer is unknown and extensive field tests would be required to estimate its value. BBI has assumed that the residue will be used as boiler fuel because this is believed to be the most likely near-term use for the lignin.

The neutralization of sulfuric acid with lime in the proposed bioethanol process creates a gypsum by-product stream. A high quality gypsum (>90% purity) would have value at the Wheatfield, Indiana site where there is a gypsum wallboard manufacturing facility. The quality of the gypsum by-product is expected to fall far short of the minimum quality required by the wallboard facility, however. Another possible use for the gypsum is as a soil conditioner. Assigning a value to the gypsum without extensive field tests would be speculative, however. A conservative approach to determining the feasibility of the two proposed ethanol facilities would be to assume that the gypsum is land filled at a cost rather than as a source of revenue.

The production of ethanol by yeast creates a carbon dioxide by-product. Currently in the U.S., about one third of fermentation carbon dioxide (CO_2) produced from ethanol plants is captured and two thirds is vented to the atmosphere. The carbon dioxide captured is in most cases from very large ethanol plants. Capture of CO_2 from medium sized and smaller plants is usually not justified unless special market conditions are present. If justified the ethanol plant can easily capture raw carbon dioxide. However, it must be processed further if it is to be used for commercial purposes.

Dry ice and liquid carbon dioxide are principally used as expendable refrigerants in the food industry. Carbon dioxide, whether solid, liquid, or gaseous, is recognized as safe for use in foods. Food applications include:

- Beef, pork, and poultry slaughter operations
- Frozen food storage and transportation
- Supplemental cooling for refrigerated products
- Meat, sausage and bakery processing

- Airline catering
- Gift food packaging
- Carbonation of beverages

Non-food applications include:

- Various chemical processes
- Dermatologists
- Blood banks
- Pharmaceutical manufacturing
- Shrink fitting
- Cryogenic blasting
- pH control

A CO_2 processing company would prefer to use high pressure CO_2 rather than liquid CO_2 since it reduces the capital costs for equipment and processing costs. Typically, a CO_2 processing company will construct a processing facility next to the ethanol plant. The raw CO_2 is then piped to the processing facility for finishing. In order for the processing facility to be economically viable, there must be a close market for the finished CO_2. Packing plants, soft drink bottlers, food processors, are just a few of the numerous users of fermentation CO_2.

The opportunity to capture carbon dioxide should not be included in the economics of determining the viability of a plant, but rather regarded as potential incremental revenue unless there is a market or an existing CO_2 plant. Revenue from CO_2 sales is normally between \$7.00 and \$10.00 per ton of CO_2 (2 to 3 ¢/gallon of ethanol).

BOC Gases, the largest CO_2 producer in the U.S., purchases the CO_2 from the New Energy ethanol plant in South Bend, Indiana, and would not be interested in the CO_2 from an ethanol plant located near Wheatfield, IN. Air Gas (Bruce Warner) has expressed interest in purchasing the project's CO_2 for \$10 per ton. The sale of CO_2 will not be included in the economic analysis, however because there are other ethanol projects proposed for the Wheatfield area that would likely capture the remaining CO_2 demand long before a corn stover bioethanol plant is built.

Nebraska has eight operating ethanol plants with a combined annual capacity of 400 million gallons of ethanol. The CO_2 market in the state is very small and there is a significant over supply of CO_2 in the region.

Conclusions for Feedstock

Feedstock Supply

There is sufficient production of corn and therefore, corn stover near the Indiana site to easily supply bioethanol plants from 30 to 70 million gallons in annual capacity. A 30 million gallon per year plant at the Wheatfield, IN site would use just 17% of the stover available on a sustainable basis within 50 miles of the site (assuming 70 gallons of ethanol are produced from each BDT of stover). A 70 MMGPY plant would use 40% of the stover available within 50 miles of the plant. "Available" stover in Indiana is assumed to be 45% of the stover that is produced; 55% is left in the field for erosion control.

Significantly more corn is grown in the area surrounding the Grand Island, Nebraska site. A 30 million gallon per year plant at the Grand Island site would use 12% of the stover available on a sustainable basis within 50 miles of the site (assuming 70 gallons of ethanol are produced from each BDT of stover). A 70 MMGPY plant would use 28% of the stover available within 50 miles of the plant. "Available" stover for the Nebraska site is assumed to be 56% of the stover that is produced; only 44% is left in the field.

At this time there is little, if any, competition for corn stover in the Midwest. Potential competing uses include animal feed, animal bedding, boiler fuel, production of other liquid fuels, composite products (particleboard), pulp and paper and chemicals. Kadam (2000) concludes that only a small portion of the available stover could be used for other purposes. The projected near-term demand for non-ethanol use is less than 10% of the total available corn stover. Pulp and paper, strawboard, and chemicals are the only possible end uses that may demand corn stover in any significant quantity in the future. Another industrial plant that uses a large quantity of corn stover would not likely locate near another large user of corn stover. The corn stover price for both facilities may increase, creating a lose-lose situation for both facilities.

Pricing

The estimated cost to deliver corn stover to the Grand Island, Nebraska site is $33.86 per BDT, and the estimated cost at the Wheatfield, Indiana site is $38.62. The lower corn yield per acre in Indiana and the requirement to leave more corn stover in the field, results in higher bailing costs per ton of stover and the stover must be collected over a greater distance resulting in higher transportation costs for Indiana.

Risk

Corn stover is currently not harvested on the scale required for a large ethanol plant and the long-term impacts of harvesting corn stover are also not well known. The lack of an ongoing, large scale corn stover harvesting, storage and delivery operation will be a serious issue for lenders that project developers must address.

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IV. DESIGN AND COST ESTIMATES

This section of the report presents an analysis of the projected capital cost estimates for 30, 50 and 70 million gallon per year ethanol plants co-located with coal-fired power plants. The two sites considered in this analysis are in Wheatfield, Indiana and Grand Island, Nebraska.

With respect to the overall design of this facility and the two sites analyzed during this processes, there were two primary assumptions incorporated. First, when considering the Wheatfield site, the ethanol plant is to be co-located with the existing RM Schahfer Generating station, which does not have sufficient steam capacity to support the new ethanol plant. As a result a conventional natural gas fired boiler system was incorporated into the overall plant design and cost estimate at the Wheatfield site.

At the Grand Island, NE site the ethanol plant is to be co-located with a new coal fired power plant, which can be designed with sufficient steam capacity to supply the ethanol plant; however due to the extended shutdown periods required by coal fired power plants, a stand-by conventional boiler system was also included into the Grand Island capital estimate. It is not unusual for a power plant boiler to be down six to eight weeks each year, while a properly operated and maintained ethanol plant should be down no more than about two weeks out of the year. Because both ethanol plants are assumed to have a natural gas boiler, the capital costs at each site were estimated based on the same plant design and layout. With respect to the natural gas boiler systems, actual cost estimates were obtained from Victory Energy a supplier of energy systems. These estimates were incorporated in the actual equipment cost numbers for this estimate.

In performing this analysis, the capital cost estimates were based on data compiled by BBI for the development and construction of seven conventional dry milling ethanol plants of similar capacities. When reviewing the cellulosic plant design, it can be seen that with the exception of the Pretreatment and Conditioning processes for the cellulosic process, the overall plant designs are very similar. The Pretreatment and Conditioning processes are more like the front end of a wet mill so wet mill equipment installation cost factors were used for estimating the installed cost of the Pretreatment and Conditioning process equipment. The project development costs (owner’s costs or soft costs) for a cellulosic plant were judged to be very similar to a dry mill plant and the typical dry mill soft costs were used to estimate the total project costs for the cellulosic plants.

Ethanol plant sizes of 30, 50 and 70 million gallons per year (MMGPY) of anhydrous ethanol production match today’s industry norms and were modeled to determine the impact of plant size on project costs. Bioethanol plant capital cost estimates were provided by NREL and the NREL equipment costs were used in the analysis as the basis for the BBI cost estimates.

Plant Process Overview

The process being analyzed here can be described as using co-current dilute acid prehydrolysis of the lignocellulosic biomass with enzymatic saccharification of the remaining cellulose and co-fermentation of the resulting glucose and xylose to ethanol. The process design also includes feedstock handling and storage, ethanol distillation and dehydration, wastewater treatment, product storage and all other required utilities. A lignin boiler is not included in the design, as the lignin residue is assumed to be sold to the coal fired power plant. A primary or backup natural gas fired boiler is included in the design, however. In all, the process is divided into eight areas (see Figure 3).

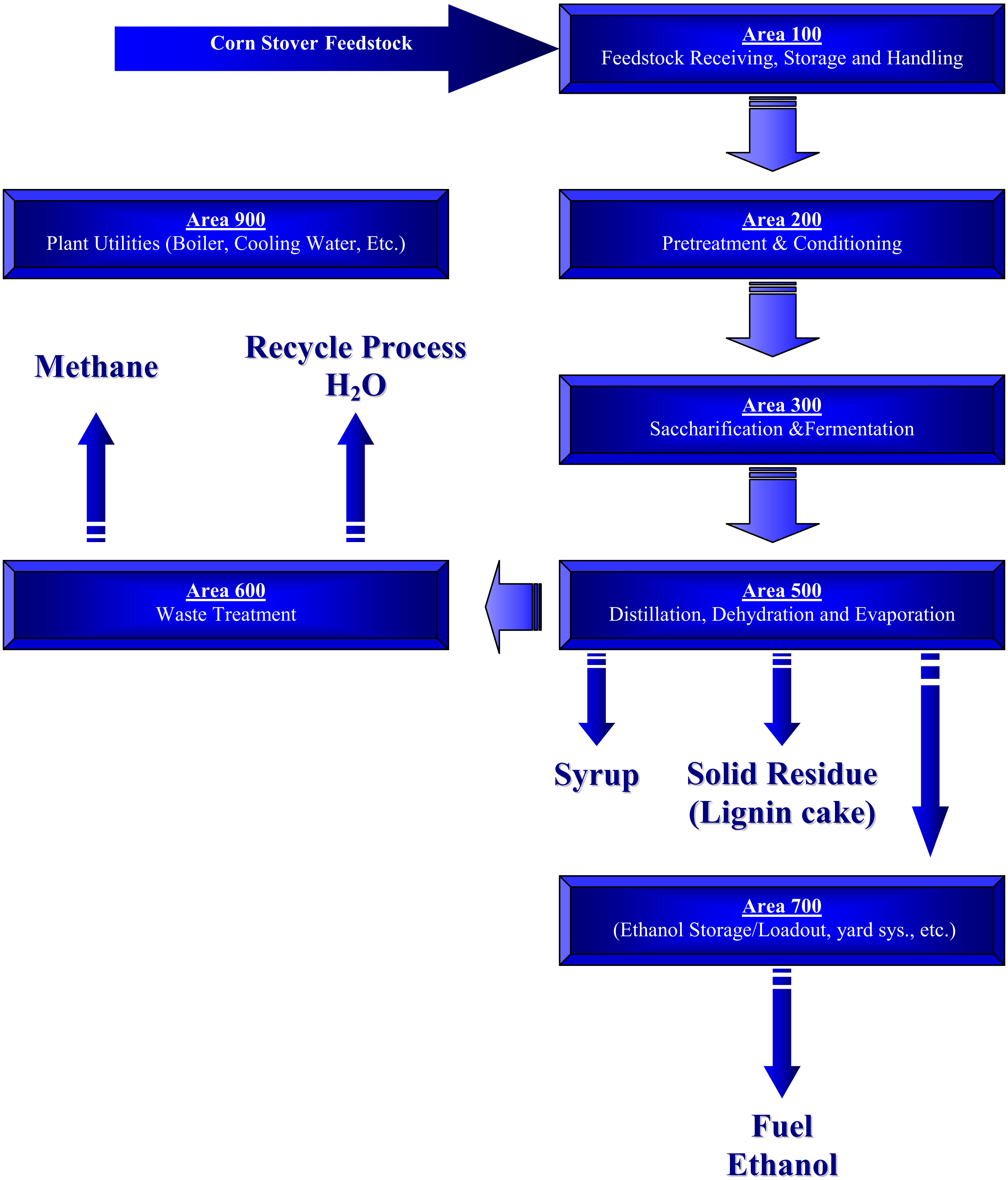
The feedstock, in this case corn stover, is delivered to the feed handling area (A100) for storage and size reduction. From there the stover is conveyed to pretreatment and detoxification (A200). In this area, the biomass is treated with dilute sulfuric acid catalyst at a high temperature for a short time, liberating the hemicellulose sugars and other compounds. Separation with washing removes the sugars and acid from the solids for neutralization. Overliming of the liquid stream is required to remove compounds liberated in the pretreatment that are toxic to the fermenting organism.

Enzymatic hydrolysis (or saccharification) coupled with co-fermentation (A300) of the detoxified hydrolyzate slurry is carried out in continuous hydrolysis tanks and anaerobic fermentation tanks in series. A purchased cellulase enzyme preparation is added to the hydrolyzate in the hydrolysis tanks that are maintained at a temperature to optimize the enzyme's activity. The fermenting organism, *Zymomonas mobilis*, is first grown in a series of progressively larger batch anaerobic fermentations to make enough cells to inoculate the main fermenters. The inoculum, along with other nutrients, is added to the first ethanol fermenter along with the partially saccharified slurry at a reduced temperature. The cellulose will continue to be hydrolyzed, although at a slower rate, at the lower temperature. After several days of separate and combined saccharification and co-fermentation, most of the cellulose and xylose will have been converted to ethanol. The resulting beer is sent to product recovery.

Product recovery (A500) involves distilling the beer to separate the ethanol from the water and residual solids. A mixture of nearly azeotropic water and ethanol is purified to pure ethanol using vapor-phase molecular sieves. Solids from the distillation bottoms are separated, dewatered and shipped as wet cake to the power plant. Concentration of the distillation bottoms liquid is performed by evaporation. The evaporated condensate is returned to the process and the concentrated syrup is sent to the power plant.

Part of the evaporator condensate, along with other wastewater, is treated by anaerobic and aerobic digestion (A600). The biogas (high in methane) from anaerobic digestion is sent to the combustor for energy recovery. The treated water is suitable for recycling and is returned to the process.

Figure 3 – Bioethanol Block Flow Diagram



Plant Capital Cost Analysis

As stated above, three separate plant capacities were analyzed with respect to projected capital cost. These capacities were 30, 50 and 70 million gallon per year. For this analysis, NREL supplied a complete plant equipment listing which included the size, material of construction, number of units required and pricing data for each piece of equipment. The capital cost estimates provided in this section were generated using the NREL equipment list and pricing data as the basis. BBI assigned equipment installation factors to the equipment costs to arrive at the installed cost. The equipment installation factors are derived from actual costs for corn ethanol dry mills. The equipment specific to the Pretreatment and Conditioning processes were identified and analyzed separately due to the abnormally high cost associated with them. This equipment was given a separate set of equipment installation factors in the cost estimate, which are more in line with the type of equipment and that of a wet mill type facility.

With respect to the estimates generated in this analysis, data obtained from various dry mill plant installations was used to develop a set of specific equipment installation factors for each element of project development and construction. The estimate was divided into three parts:

- Capital Investment Hard Cost Allocation
- Capital Investment Soft Cost Allocation
- Total Capital Investment Cost Allocation

The "Capital Investment Hard Cost Allocation," is the cost associated with constructing the ethanol plant and includes costs such as equipment costs, mechanical installation, electrical installation and various other construction costs.

"Capital Investment Soft Cost Allocation" is the cost associated with the ethanol plant owner's project expense that would be capitalized once the project is transferred to operations. Some line items included in the Soft Cost Allocation are financing and project development costs, owner's project administration expenses, owner's supplied construction assets (land), pre-startup operations expenses and beginning inventories.

The "Total Capital Investment Cost Allocation" is the summation of the hard and soft costs described above giving a total project capital investment figure. Table 21, Table 22 and Table 23 at the end of this section show the breakdown of the hard and soft costs. Each of the line items included within each cost area was assigned an installation factor that was developed from cost data for recently constructed ethanol dry mill projects. Table 15 presents a summary of the results of this process.

Table 15 – Capital Cost Summary

Capital Investment Summary			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Capital Hard Cost Investment	$ 65,521,275	$ 92,403,780	$ 116,581,752
Capital Soft Cost Investment	$ 7,280,142	$ 12,600,516	$ 18,978,425
Total Capital Cost Investment	$ 72,801,417	$ 105,004,296	$ 135,560,177

To continue this analysis, NREL supplied a set of project capital cost estimates for each of the stated ethanol plant capacities. These cost estimates were developed by utilizing the equipment pricing data and various construction multipliers to generate each of the cost estimates. Each estimate was again divided into three parts for analysis.

In the Table 16, which compares the construction hard cost investment, there is an average 33% variance between the BBI and NREL estimates. This difference is largely due to the difference in the construction multipliers. The NREL construction multipliers are based on a composite of construction projects that may or may not be related to this type of installation whereas the estimates developed by BBI use multipliers from data from dry and wet mill ethanol projects, which incorporate similar equipment.

Table 16 – Capital Hard Cost Investment Summary Analysis

Capital Hard Cost Investment Summary			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Conventional Hard Cost Factors	$ 65,521,275	$ 92,403,780	$ 116,581,752
NREL Hard Cost Factors	$ 49,464,986	$ 69,469,877	$ 86,894,816
Variance	32.5%	33.0%	34.2%

In Table 17, which is a comparison of the project soft cost investment, there is again a large differential between the BBI and NREL soft cost estimates; however, in this case the order is reversed. The NREL soft cost estimates average 71% higher than those figures generated in the BBI analysis. Again, the BBI analysis is based on historical dry mill ethanol project data.

Table 17 – Capital Soft Cost Investment Summary Analysis

Capital Soft Cost Investment Summary			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Conventional Soft Cost Factors	$ 7,280,142	$ 12,600,516	$ 18,978,425
NREL Soft Cost Factors	$ 31,064,011	$ 43,627,083	$ 54,569,945
Variance	-76.6%	-71.1%	-65.2%

In Table 18, which is a comparison of the project total cost investment, the two estimates fall within the range of 10% differential with this estimate averaging a lower total capital investment cost. Based on these figures, it can be concluded that both methods of project estimating present an estimate within the range of plus/minus 20% of the actual project cost. However, the distribution of those funds does differ greatly and should be continually reviewed as the project is developed.

Table 18 – Total Capital Cost Investment Summary Analysis

Total Capital Cost Investment Summary			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Conventional Cost Factors	$ 72,801,417	$ 105,004,296	$ 135,560,177
NREL Cost Factors	$ 80,528,998	$ 113,096,960	$ 141,464,761
Variance	-9.6%	-7.2%	-4.2%

The ethanol industry has seen a major decline in the project capital investment per gallon of production for dry mill plants over the past 15 years. In Table 19, the conventional dry milling ethanol production facility average investment cost per gallon is compared to the estimated corn stover ethanol plant capital cost per gallon presented here.

Table 19 – Capital Investment per Gallon Produced Summary Analysis

Capital Investment per Gallon Produced			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Conventional Dry Mill Facility	$ 1.62	$ 1.47	$ 1.38
Bioethanol Facility	$ 2.43	$ 2.10	$ 1.94

As demonstrated in the table above the corn stover bioethanol facility has a capital investment cost that averages approximately 44% higher than that of a conventional corn dry milling facility. This factor will play a major role in determining the viability of this type of facility. To better understand the basis for this difference, a detailed review of each estimate was preformed. During that review one major component was found to be the driving force for the higher capital cost of the bioethanol facility.

In Table 20, the corn stover plant equipment cost is compared to the conventional dry milling equipment cost. The estimated equipment cost for the cellulosic facility runs on average 56% higher than that of the conventional dry mill process.

Table 20 – Conventional Equipment Capital Cost Analysis

Conventional Equipment Capital Cost Analysis			
Plant Capacity	**30MMGPY**	**50MMGPY**	**70MMGPY**
Conventional Dry Mill Facility	$9,750,054	$ 16,250,090	$ 22,750,126
Bioethanol Facility	$ 17,241,658	$ 24,788,065	$ 31,840,279
Variance	76.8%	52.5%	40.0%

The reason for the higher corn stover plant equipment cost is the dilute acid/enzymatic ethanol process itself. The average alcohol concentration in the fermentation process in the bioethanol process is approximately 7% by volume, whereas the average alcohol concentration in a corn dry mill ethanol plant is about 14%. With the additional water in the bioethanol process, the number of pieces equipment and the size of the equipment are directly impacted resulting in higher capital cost not just for the equipment but for the construction as a whole through increased quantities of concrete, steel, piping, instrumentation, etc. The capital cost of the bioethanol process can be reduced by additional research and process improvements that decrease the amount of water carried into the fermentation and distillation process areas.

Details of the BBI capital cost estimates presented in this section for the corn stover ethanol process are presented in the following tables.

Table 21 – 30 Million Gallons per Year Capacity Cost Projection

Project Name	**NREL Bioethanol Co-Location Project**	
Project Location	**Indiana & Nebraska Sites**	
Plant Design Capacity	**30,000,000**	
Capital Investment Hard Cost Allocation – 30 MMGPY		
Conventional Equipment Calculations	**Installed Cost**	**Installation Factor**
Major Equipment & Field Tanks	$11,581,203	40.0%
Equipment Freight & Handling	$289,530	1.0%
Instrumentation & Controls	$781,731	2.7%
Electrical	$2,229,381	7.7%
Protective Coverings	$289,530	1.0%
Mechanical	$3,011,113	10.4%
Steel Structures	$810,684	2.8%
Concrete	$1,505,556	5.2%
Buildings	$984,402	3.4%
Civil/Site	$1,273,932	4.4%
Equipment Rental/Consumables	$376,389	1.3%
Subtotal Construction	**$23,133,452**	**80%**
Construction Contingency	$2,026,710	7.0%
Total Construction Cost	**$25,160,163**	**87%**
Process Licensing Fees	$347,436	1.2%
Detailed Engineering	$1,737,180	6.0%
DCS Engineering	$57,906	0.2%
Procurement Services	$57,906	0.2%
Construction Management	$868,590	3.0%
Field Expenses	$173,718	0.6%
EPC Fees	$550,107	1.9%
Subtotal Project Services	$3,792,844	**13%**
Total Conventional Equipment EPC Cost	**$28,953,006**	**100.0%**
Pretreatment and Conditioning Equipment Calculations		
Major Equipment & Field Tanks	$16,090,038	44.0%
Equipment Freight & Handling	$365,683	1.0%
Instrumentation & Controls	$2,194,096	6.0%
Electrical	$2,925,461	8.0%
Protective Coverings	$731,365	2.0%
Mechanical	$5,485,240	15.0%
CSA	$1,023,912	2.8%
Subtotal Construction	**$28,815,796**	**79%**
Construction Contingency	$2,559,779	7.0%
Total Construction Cost	**$36,568,269**	**86%**
Process Licensing Fees	$347,436	1.2%
Detailed Engineering	$1,737,180	6.0%
DCS Engineering	$57,906	0.2%
Procurement Services	$57,906	0.2%
Construction Management	$868,590	3.0%
Field Expenses	$463,248	1.6%
EPC Fees	$579,060	2.0%
Subtotal Project Services	$4,111,327	**14%**
Total Pretreatment & Conditioning EPC Cost	**$36,568,269**	**100.0%**

Capital Investment Soft Cost Allocation – 30 MMGPY		
Financing and Development Cost		
Legal, document preparation, etc.	$749,355	10.3%
Bank legal	$129,195	1.8%
Other due diligence	$79,523	1.1%
Consultants	$519,961	7.1%
Closing - legal and misc. closing costs	$22,328	0.3%
Title insurance & recording fees	$48,937	0.7%
Subtotal	**$1,549,300**	**21.3%**
Owner's Project Admin Expenses (capitalized)		
Preliminary permitting and site design	$61,172	0.8%
Site office	$83,805	1.2%
Owner utilities allowance	$58,725	0.8%
Owners project manager & bank's engineer	$207,984	2.9%
Legal and accounting	$42,820	0.6%
Travel	$39,762	0.5%
Insurance - liability, workman's comp.	$21,410	0.3%
Builders risk insurance	$69,736	1.0%
Project construction interest	$1,340,887	18.4%
Project construction commitment fee	$654,539	9.0%
Directors fee's and travel expenses	$67,289	0.9%
Subtotal	**$2,648,129**	**36.4%**
Owner Supplied Construction & Assets		
Owners discretionary project cost	$526,231	7.2%
Land	$152,930	2.1%
Spare parts inventory, hand tools	$214,101	2.9%
Vehicles, forklift & maintenance equipment	$94,816	1.3%
Office equipment	$91,758	1.3%
Prepaid insurance premium	$137,637	1.9%
Sales tax	$30,586	0.4%
Subtotal	**$1,248,059**	**17.1%**
Pre-startup operations - capitalized expenses		
Plant management	$433,097	5.9%
Other staff	$238,570	3.3%
Operations training contract	$122,344	1.7%
Utilities, telephone, travel, supplies & misc.	$30,586	0.4%
Plant utilities - miscellaneous startup prep	$348,680	4.8%
Subtotal	**$1,173,276**	**16.1%**
Beginning Inventories		
Corn Stover	$469,800	6.5%
Chemicals	$137,961	1.9%
Denaturant	$53,617	0.7%
Subtotal	**$661,378**	**9.1%**
Total Capital Investment Soft Cost	**$7,280,142**	**100%**

Capital Investment Summary – 30 MMGPY		
Total Project EPC Cost (Hard Cost Allocation)	$65,521,275	90%
Total Capital Investment Soft Cost	$7,280,142	10%
Total Capital Investment Cost	**$72,801,417**	**100%**
Capital Investment per Gallon	**$2.43**	

Table 22 – 50 Million Gallons per Year Capacity Cost Projection

Project Name	**NREL Bioethanol Co-Location Project**	
Project Location	**Indiana & Nebraska Sites**	
Plant Design Capacity	**50,000,000**	
Capital Investment Hard Cost Allocation		
Conventional Equipment Calculations	**Installed Cost**	**Installation Factor**
Major Equipment & Field Tanks	$16,958,161	40.0%
Equipment Freight & Handling	$423,954	1.0%
Instrumentation & Controls	$1,144,676	2.7%
Electrical	$3,264,446	7.7%
Protective Coverings	$423,954	1.0%
Mechanical	$4,409,122	10.4%
Steel Structures	$1,187,071	2.8%
Concrete	$2,204,561	5.2%
Buildings	$1,441,444	3.4%
Civil/Site	$1,865,398	4.4%
Equipment Rental/Consumables	$551,140	1.3%
Subtotal Construction	**$33,873,926**	**80%**
Construction Contingency	$2,967,678	7.0%
Total Construction Cost	**$36,841,604**	**87%**
Process Licensing Fees	$508,745	1.2%
Detailed Engineering	$2,543,724	6.0%
DCS Engineering	$84,791	0.2%
Procurement Services	$84,791	0.2%
Construction Management	$1,271,862	3.0%
Field Expenses	$254,372	0.6%
EPC Fees	$805,513	1.9%
Subtotal Project Services	$5,553,798	**13%**
Total Conventional Equipment EPC Cost	**$42,395,401**	**100.0%**
Pretreatment and Conditioning Equipment Calculations		
Major Equipment & Field Tanks	$22,003,687	44.0%
Equipment Freight & Handling	$500,084	1.0%
Instrumentation & Controls	$3,000,503	6.0%
Electrical	$4,000,670	8.0%
Protective Coverings	$1,000,168	2.0%
Mechanical	$7,501,257	15.0%
CSA	$1,400,235	2.8%
Subtotal Construction	**$39,406,603**	**79%**
Construction Contingency	$3,500,587	7.0%
Total Construction Cost	**$42,907,189**	**86%**
Process Licensing Fees	$600,101	1.2%
Detailed Engineering	$3,000,503	6.0%
DCS Engineering	$100,017	0.2%
Procurement Services	$100,017	0.2%
Construction Management	$1,500,251	3.0%
Field Expenses	$800,134	1.6%
EPC Fees	$1,000,168	2.0%
Subtotal Project Services	$7,101,190	**14%**
Total Pretreatment & Conditioning EPC Cost	**$50,008,379**	**100.0%**

Capital Investment Soft Cost Allocation		
Financing and Development Cost		
Legal, document preparation, etc.	$1,296,989	10.3%
Bank legal	$223,611	1.8%
Other due diligence	$137,640	1.1%
Consultants	$899,951	7.1%
Closing - legal and misc. closing costs	$38,645	0.3%
Title insurance & recording fees	$84,701	0.7%
Subtotal	**$2,681,537**	**21.3%**
Owner's Project Admin Expenses (capitalized)		
Preliminary permitting and site design	$105,877	0.8%
Site office	$145,051	1.2%
Owner utilities allowance	$101,642	0.8%
Owners project manager & bank's engineer	$359,981	2.9%
Legal and accounting	$74,114	0.6%
Travel	$68,820	0.5%
Insurance - liability, workman's comp.	$37,057	0.3%
Builders risk insurance	$120,699	1.0%
Project construction interest	$2,320,816	18.4%
Project construction commitment fee	$1,132,880	9.0%
Directors fee's and travel expenses	$116,464	0.9%
Subtotal	**$4,583,399**	**36.4%**
Owner Supplied Construction & Assets		
Owners discretionary project cost	$910,804	7.2%
Land	$264,692	2.1%
Spare parts inventory, hand tools	$370,568	2.9%
Vehicles, forklift & maintenance equipment	$164,109	1.3%
Office equipment	$158,815	1.3%
Prepaid insurance premium	$238,222	1.9%
Sales tax	$52,938	0.4%
Subtotal	**$2,160,148**	**17.1%**
Pre-startup operations - capitalized expenses		
Plant management	$749,607	5.9%
Other staff	$412,919	3.3%
Operations training contract	$211,753	1.7%
Utilities, telephone, travel, supplies & misc.	$52,938	0.4%
Plant utilities - miscellaneous startup prep	$603,497	4.8%
Subtotal	**$2,030,714**	**16.1%**
Beginning Inventories		
Corn Stover	$813,133	6.5%
Chemicals	$238,784	1.9%
Denaturant	$92,801	0.7%
Subtotal	**$1,144,717**	**9.1%**
Total Capital Investment Soft Cost	**$12,600,516**	**100%**
Capital Investment Summary		
Total Project EPC Cost (Hard Cost Allocation)	$92,403,780	88%
Total Capital Investment Soft Cost	$12,600,516	12%
Total Capital Investment Cost	**$105,004,296**	**100%**
Capital Investment per Gallon	**$2.10**	

Table 23 – 70 Million Gallons per Year Capacity Cost Projection

Project Name	**NREL Bioethanol Co-Location Project**	
Project Location	**Indiana & Nebraska Sites**	
Plant Design Capacity	**70,000,000**	
Capital Investment Hard Cost Allocation		
Conventional Equipment Calculations	**Installed Cost**	**Installation Factor**
Major Equipment & Field Tanks	$22,229,280	40.0%
Equipment Freight & Handling	$555,732	1.0%
Instrumentation & Controls	$1,500,476	2.7%
Electrical	$4,279,136	7.7%
Protective Coverings	$555,732	1.0%
Mechanical	$5,779,613	10.4%
Steel Structures	$1,556,050	2.8%
Concrete	$2,889,806	5.2%
Buildings	$1,889,489	3.4%
Civil/Site	$2,445,221	4.4%
Equipment Rental/Consumables	$722,452	1.3%
Subtotal Construction	**$44,402,986**	**80%**
Construction Contingency	$3,890,124	7.0%
Total Construction Cost	**$48,293,110**	**87%**
Process Licensing Fees	$666,878	1.2%
Detailed Engineering	$3,334,392	6.0%
DCS Engineering	$111,146	0.2%
Procurement Services	$111,146	0.2%
Construction Management	$1,667,196	3.0%
Field Expenses	$333,439	0.6%
EPC Fees	$1,055,891	1.9%
Subtotal Project Services	$7,280,089	**13%**
Total Conventional Equipment EPC Cost	**$55,573,200**	**100.0%**
Pretreatment and Conditioning Equipment Calculations		
Major Equipment & Field Tanks	$26,843,763	44.0%
Equipment Freight & Handling	$610,086	1.0%
Instrumentation & Controls	$3,660,513	6.0%
Electrical	$4,880,684	8.0%
Protective Coverings	$1,220,171	2.0%
Mechanical	$9,151,283	15.0%
CSA	$1,708,239	2.8%
Subtotal Construction	**$48,074,740**	**79%**
Construction Contingency	$4,270,599	7.0%
Total Construction Cost	**$52,345,338**	**86%**
Process Licensing Fees	$732,103	1.2%
Detailed Engineering	$3,660,513	6.0%
DCS Engineering	$122,017	0.2%
Procurement Services	$122,017	0.2%
Construction Management	$1,830,257	3.0%
Field Expenses	$976,137	1.6%
EPC Fees	$1,220,171	2.0%
Subtotal Project Services	$8,663,215	**14%**
Total Pretreatment & Conditioning EPC Cost	**$61,008,553**	**100.0%**

Capital Investment Soft Cost Allocation		
Financing and Development Cost		
Legal, document preparation, etc.	$1,953,476	10.3%
Bank legal	$336,795	1.8%
Other due diligence	$207,308	1.1%
Consultants	$1,355,473	7.1%
Closing - legal and misc. closing costs	$58,206	0.3%
Title insurance & recording fees	$127,574	0.7%
Subtotal	**$4,038,831**	**21.3%**
Owner's Project Admin Expenses (capitalized)		
Preliminary permitting and site design	$159,467	0.8%
Site office	$218,470	1.2%
Owner utilities allowance	$153,089	0.8%
Owners project manager & bank's engineer	$542,189	2.9%
Legal and accounting	$111,627	0.6%
Travel	$103,654	0.5%
Insurance - liability, workman's comp.	$55,814	0.3%
Builders risk insurance	$181,793	1.0%
Project construction interest	$3,495,526	18.4%
Project construction commitment fee	$1,706,301	9.0%
Directors fee's and travel expenses	$175,414	0.9%
Subtotal	**$6,903,345**	**36.4%**
Owner Supplied Construction & Assets		
Owners discretionary project cost	$1,371,818	7.2%
Land	$398,669	2.1%
Spare parts inventory, hand tools	$558,136	2.9%
Vehicles, forklift & maintenance equipment	$247,174	1.3%
Office equipment	$239,201	1.3%
Prepaid insurance premium	$358,802	1.9%
Sales tax	$79,734	0.4%
Subtotal	**$3,253,534**	**17.1%**
Pre-startup operations - capitalized expenses		
Plant management	$1,129,029	5.9%
Other staff	$621,923	3.3%
Operations training contract	$318,935	1.7%
Utilities, telephone, travel, supplies & misc.	$79,734	0.4%
Plant utilities - miscellaneous startup prep	$908,964	4.8%
Subtotal	**$3,058,585**	**16.1%**
Beginning Inventories		
Corn Stover	$1,224,710	6.5%
Chemicals	$359,647	1.9%
Denaturant	$139,773	0.7%
Subtotal	**$1,724,130**	**9.1%**
Total Capital Investment Soft Cost	**$18,978,425**	**100%**
Capital Investment Summary		
Total Project EPC Cost (Hard Cost Allocation)	$116,581,752	86%
Total Capital Investment Soft Cost	$18,978,425	14%
Total Capital Investment Cost	**$135,560,177**	**100%**
Capital Investment per Gallon	**$1.94**	

V. FINANCIAL EVALUATION

This section of the report presents the projected financial performance of 30, 50 and 70 million gallon per year ethanol plants co-located with coal-fired power plants. BBI's financial model for ethanol production was used to project the financial performance of the co-located ethanol plants in Wheatfield, Indiana and Grand Island, Nebraska. At the Wheatfield site the ethanol plant is to be co-located with the existing RM Schahfer Generating station. At the Grand Island site the ethanol plant is to be co-located with a new coal fired power plant being considered by Nebraska Public Power.

The approach for the study was to use conservative assumptions throughout the financial analysis to arrive at an estimate of the minimum return that can be reasonably expected for the project based on the capital costs and plant performance criteria provided by NREL. This scenario is referred to as the "base case" throughout this report. Sensitivity analyses were then run to determine the variables that have the greatest potential impact on the projected profitability of the project. Internal Rate of Return (IRR) was used to measure the projected profitability of the project.

Ethanol plant sizes of 30, 50 and 70 million gallons per year (MMGPY) of anhydrous ethanol production were modeled to determine the most appropriate plant size for the project. Bioethanol plant capital and operating cost estimates were provided by NREL, as were the estimated ethanol and byproduct yields, energy consumption and utility and chemical usage of the ethanol plant. The NREL design is for an n^{th} plant design and, therefore, does not include additional costs that will likely be incurred by the first generation of bioethanol plants to mitigate the risks associated with commercializing new technologies. The ethanol plant is assumed to be designed for a 20-year project life and equipment is depreciated over 20 years in the project proforma.

BBI's financial model includes all significant plant inputs and outputs that affect the profitability. These include ethanol production costs and revenues, byproduct revenues, capital costs including project development, financing, construction, start-up, working capital and inventory costs. The model calculates the month-by-month project costs for the first 24 months of the project following the close of financing. The model also produces a 10-year operating forecast for the project. The complete proformas for each plant location and size are included at the end of this section of the report.

Assumptions Used in the Financial Forecast

Fuel ethanol is to be produced from corn stover feedstock using a dilute acid prehydrolysis and enzymatic saccharification and co-fermentation process under development by DOE/NREL and others. The latest NREL design report for this process can be found on the Internet at http://www.afdc.doe.gov/pdfs/6483a.doc. Please refer to this report for specifics of the process design and plant performance specifications, which have been provided by NREL and used in the following analysis.

The composition of the corn stover feedstock and the approximate ethanol yields used in the analysis are shown in Table 24.

Table 24 – Approximate composition and ethanol yield data for corn stover

Component	Percent by weight	Theoretical Ethanol Yield (gal/BDT)	Projected Actual Ethanol Yield (gal/BDT)
Cellulose	37.5%	66.24	
Xylan	21.1%	37.27	
Arabinan	2.9%	5.12	
Mannan	1.6%	2.76	
Galactan	1.9%	3.28	
Lignin and other	35.0%	0	
	100%	115	89.7
% of Theoretical			80%

The overall yield of ethanol from a dry ton of corn stover is assumed to be 89.7 gallons or 80% of the theoretical yield based on the corn stover composition shown in Table 24. This is a key assumption for the financial analysis as the ethanol yield has a significant impact on the economics as demonstrated in the sensitivity analysis later in this section.

Other important variables and the values used in the financial analysis are discussed below and summarized in Table 29 and Table 30, which follow.

- *Ethanol Price*. The ethanol price used in the financial forecast is \$1.21 per gallon of denatured ethanol. The shipping costs are 5.9¢ per gallon for Indiana and 6.9¢ per gallon for Nebraska. The ethanol marketing or sales cost is about 1.2¢ per gallon. We have used the 10-year average Chicago ethanol price of \$1.21 per gallon for the sales price in the financial analysis (see Figure 4). The average price in Omaha, Nebraska for the past 10 years was also \$1.21 per gallon. Ethanol prices in the financial analysis are inflated 2% annually.

  The ethanol shipping cost is an important variable for the financial analysis. The 6¢ to 7¢ per gallon used for the average ethanol shipping cost was calculated as shown in Table 25 below. For the Grand Island, Nebraska site we have assumed no local market, 75% of the ethanol sold in the regional market and 25% sold in the national market (west coast). For the Wheatfield, Indiana site we have assumed that 50% of the ethanol will be sold in the local Chicago market and 25% in the regional and national markets. The shipping costs for the local, regional and national markets are based on BBI's experience in conducting feasibility studies and preparing business plans for ethanol plants.

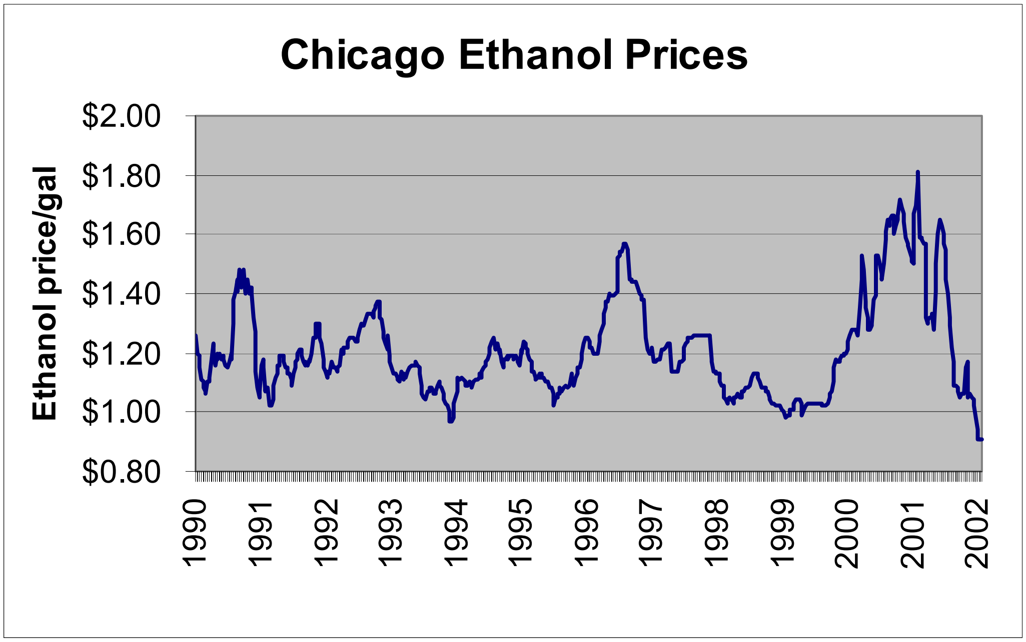
Table 25 – Average ethanol shipping cost

Nebraska Site	¢/gal	Market %	¢/gal
Local shipping cost	3.0	0%	0.00
Shipping cost to regional markets	5.0	75%	3.75
Shipping cost to national markets	12.6	25%	3.15
Average Shipping Cost			**6.90**
Indiana Site	¢/gal	Market %	¢/gal
Local shipping cost	3.0	50%	1.50
Shipping cost to regional markets	5.0	25%	1.25
Shipping cost to national markets	12.6	25%	3.15
Average Shipping Cost			**5.90**

Ethanol prices are relatively volatile and follow the changes in the wholesale price of unleaded regular gasoline with additional volatility due to local, regional and national supply and demand for ethanol. Both ethanol and gasoline are commodities and the price is difficult to predict, but the 10-year average price is a price that lenders will generally accept in business plan proformas.

In addition to long term average pricing, the minimum ethanol price in a specific market is an important number from the lenders perspective. Ethanol projects must be able to "cash flow" at low ethanol prices or provide another mechanism for maintaining cash flow when ethanol prices drop below $1.00 per gallon. The cash flow breakeven point for ethanol price will be determined in the sensitivity analysis.

Figure 4 – Historical ethanol pricing at Chicago gasoline terminal



(Source: Oxy Fuel News)

- *Feedstock Price*. The base case feedstock price for corn stover in Nebraska is \$33.86 per dry ton delivered to the ethanol facility, and \$38.62 per BDT in Indiana. Please see the Feedstock Supply Report for a discussion of the feedstock price. A reasonable range that will be evaluated for feedstock pricing sensitivity is \$25 to \$45 per BDT.

- *Feedstock Inventory*. Corn stover for ethanol production will likely be harvested in the fall after the normal corn harvest. A large amount of corn stover will have to be stored for use throughout the year. A 70 MMGPY plant will require 780,000 BDT of corn stover each year. The ownership of the corn stover after harvest will impact the feedstock inventory cost for the project. At \$35 per BDT the annual feedstock cost would be about \$27 million for a 70 MMGPY plant. The ethanol plant will not be able to pay for a full year's worth of corn stover in the fall, but rather it is more likely that the farmers will retain ownership until the stover is delivered to the ethanol plant. If farmers retain ownership of the corn stover until it is delivered to the ethanol plant, inventory costs to the plant would be similar to corn dry mill ethanol plants, which typically have 10 days of corn storage. The impact of the number of days of corn stover inventory will be determined in the sensitivity study.

- *Lignin Residue Price*. Conversion of corn stover feedstock to ethanol will produce a byproduct residue, which will be primarily lignin and other unconverted material from the corn stover. This lignin byproduct residue is assumed to be sold to the coal fired power plant to be used as boiler fuel. The base case assumes that the lignin residue is dewatered to about 52% moisture and then sold for the same price as coal in the area on a BTU basis. The amount of lignin residue produced and the calculated value is shown in Table 26 below. Lignin residue prices from $0 to $20 per dry ton will be evaluated in the sensitivity study.

Table 26 – Lignin residue production and price to power plant

	Bioethanol Plant Size		
Lignin Residue	**30 MMGPY**	**50 MMGPY**	**70 MMGPY**
Production, wet basis (kg/hr)	36,265	60,441	84,618
Moisture %	51.5%	51.5%	51.5%
Production, dry basis (kg/hr)	17,588	29,314	41,040
Annual production, dry basis (ton/year)	162,887	271,478	380,069
Lignin residue yield, dry basis (lb/BDT)	974	974	974
Lignin residue LHV (BTU/wet lb)	2,892	2,892	2,892
Average Indiana utility coal price ($/MMBTU)	$1.11	$1.11	$1.11
Lignin Residue Value - Indiana ($/wet ton)	$6.42	$6.42	$6.42
Lignin Residue Value - Indiana ($/dry ton)	$13.24	$13.24	$13.24
Average Nebraska utility coal price ($/MMBTU)	$0.55	$0.55	$0.55
Lignin Residue Value - Nebraska ($/wet ton)	$3.18	$3.18	$3.18
Lignin Residue Value - Nebraska ($/dry ton)	$6.56	$6.56	$6.56

- *Sale of Carbon Dioxide*. The sale of carbon dioxide (CO2) is very site specific and depends upon the local supply and demand for CO2. There is a significant oversupply of CO2 in the central Nebraska area and a growing supply in the northwest Indiana area. The sale of CO2 will, therefore not be included in the financial analysis. The revenue from CO2 is usually relatively minor in any event.

- *State Producer Payment.* There is no state producer payment for ethanol production in Indiana. Nebraska has a producer payment of 18¢ per gallon on the first 15,625,000 gallons of ethanol produced each year for eight years. The Nebraska producer payment will be included in the financial analysis for the Grand Island, Nebraska site. State producer payments are subject to the whims of state legislatures and the financial conditions of state budgets, however and the producer payments can change during the period of expected payments.

- *Federal Small Producer Tax Credit*. The financial forecast includes the Federal Small Producer Tax Credit for the 30 MMGPY plant, but not the larger 50 and 70 MMGPY plants. The Small Producer Tax Credit is 10¢ per gallon on the first 15 million gallons of ethanol produced annually ($1.5 million annually) by plants of 30 MMGPY size or smaller. The credit is currently scheduled to expire at the end of 2007, but it is likely that the credit will be extended beyond 2007. The credit also currently only applies to plants that produce 30 million gallons per year and smaller, but legislation pending in the U.S. Congress would allow plants up to 60 MMGPY to qualify for the credit. To simplify the financial calculations when included in the financial forecast, the Federal Small Producer Tax Credit is assumed to be a payment to the project. The "value" of the tax credit when viewed as income is reduced to about 7¢ per gallon rather than the full 10¢ per gallon tax credit (the credit is considered taxable income and taxes must be paid on the amount credited).

- *Financing*. BBI recommends at least 40% equity for financing ethanol plants. Plants have been financed with less equity, but the larger debt payments can be problematic when ethanol prices are low or grain prices rise. The impact of higher and lower levels of equity will be determined.

- *Steam Supply*. Steam for the ethanol plant in Wheatfield, Indiana is assumed to be produced by the ethanol plant's natural gas boiler. The coal fired power plant does not have excess steam available to sell to the ethanol plant. The cost of a natural gas boiler has been added to the capital cost estimate provided by NREL for the Wheatfield site analysis. Natural gas for the boiler is assumed to be purchased on the open market at the average price for industrial users in Indiana. Historical natural gas pricing for Indiana is shown in Table 27. The average historical natural gas price to industrial users in Indiana was $4.08 per MCF from 1993 through 2000. A conservative $4.50 per MCF has been used in the financial model for the cost of natural gas. The natural gas cost is escalated 2% each year.

Table 27 – Average Natural Gas Price to Indiana Industrial Consumers ($/MCF)

Year	1993	1994	1995	1996	1997	1998	1999	2000	**Avg.**
Indiana	$3.71	$4.60	$3.41	$3.62	$4.33	$4.28	$4.16	$4.51	**$ 4.08**

Source: http://www.eia.doe.gov

Steam supply for the Grand Island ethanol plant is assumed to be provided by the new coal fired power plant being considered by Nebraska Public Power. The cost of coal for utility power plants in Nebraska is very low at about $0.55 per million BTU, which should result in a low steam price to the ethanol plant. Nebraska Public Power was unable to provide a firm price, but $3.00 per 1,000 pounds of steam is believed to be a conservative estimate given the fuel costs for the project. The steam price is escalated at 2% per year.

- *Electricity Price.* The price of electricity for the Wheatfield, Indiana project is estimated to be 4.o¢ per kWh based on discussions with Northern Indiana Public Service Company. The price for the Grand Island, Nebraska ethanol plant is estimated at 3.0¢ per kWh based on discussions with Nebraska Public Power. The price of electricity is escalated at 2% per year.

- *Chemical Costs.* The chemical costs for the ethanol plant were provided by NREL and are listed in Table 28 below. Cellulase enzyme required to convert cellulose in the corn stover to glucose is assumed to be purchased for 10.08¢ per gallon of ethanol produced. Chemical costs are escalated 1% per year.

Table 28 – Chemical costs for ethanol production (source: NREL)

Chemical	**¢/gallon**
Clarifier Polymer	0.94
Sulfuric Acid	1.09
Hydrated Lime	2.23
Corn Steep Liquor	2.81
Purchased Cellulase Enzyme	10.08
Diammonium Phosphate	0.31
Propane	0.00
Boiler Chemicals	0.04
Cooling Tower Chemicals	0.05
Wastewater Chemicals	0.24
Wastewater Polymer	0.01
Total Chemical Cost	**17.81**

Table 29 – Assumptions used in the financial forecast for Wheatfield, Indiana

Model Input	Indiana	Nebraska
Ethanol yield (gal/BDT)	89.7	89.7
Ethanol selling price ($/gal)	$1.21	$1.21
Ethanol transportation cost ($/gal)	$0.059	$0.069
Ethanol sales commission (% of price)	1%	1%
Delivered corn stover price ($/BDT)	$38.62	$33.86
Lignin residue yield (dry lb/BDT)	974	974
Lignin residue price ($/dry ton)	$13.24	$6.56
CO_2 sold	No	No
Electricity use (kWh/gallon ethanol)	1.42	1.42
Electricity price ($/kWh)	$0.040	$0.030
Natural gas use (BTU/gallon ethanol)	40,915	NA
Natural gas price ($/MCF)	$4.50	NA
Steam use (BTU/gallon ethanol)	NA	36,824
Steam price ($/1000 lbs)	NA	$3.00
Makeup water (gal/BDT of feedstock)	536	536
Makeup water price ($/1000 gallon)	$0.50	$0.50
Wastewater (gal/BDT of feedstock)	343	343
Wastewater cost ($/1000 gallon)	$1.00	$1.00
Solid waste (ton/BDT of feedstock)	0.0865	0.0865
Solid waste disposal price ($/ton)	$10.00	$10.00
Denaturant use (% of ethanol sold)	5%	5%
Denaturant price ($/gallon)	$0.70	$0.70
Cellulase enzymes	$0.1008	$0.1008
Other chemicals ($/gallon ethanol)	$0.0773	$0.0773
Maintenance materials (% of capital cost)	2.0%	2.0%
Property tax & insurance (% of equip. cost)	2.0%	2.0%
Debt/equity ratio	60% / 40%	60% / 40%
Debt interest rate	8%	8%
Loan term	10 years	10 years
Land	75 acres	75 acres
Cost of land per acre	$3,000	$3,000
State Incentives	None	$2.8 million/year

Assumptions that change according to the plant size are shown in Table 30 below with the corresponding values for 30, 50 and 70 million gallon per year plants.

Table 30 – Assumptions for different ethanol plant sizes

Model Input	30 MMGPY	50 MMGPY	70 MMGPY
Ethanol plant capital cost (note 1)	$51,949,000	$73,281,000	$92,478,000
Number of employees	49	60	71
Administration building	$250,000	$300,000	$350,000
Rail improvements	$500,000	$750,000	$1,000,000
Site Development Cost	$1,000,000	$1,200,000	$1,400,000
Organizational Costs	$500,000	$600,000	$700,000
Spare Parts	$500,000	$600,000	$700,000
Startup Costs	$1,000,000	$1,200,000	$1,400,000
Monthly Office/Lab expenses	$6,000	$8,000	$10,000
Federal Small Producer Tax Credit	Yes	No	No

Note 1. Includes cost of natural gas boiler for both sites – see Design and Cost Estimates section

There is no provision for payment of income taxes in the financial forecast, as the structure and ownership of the project has not been determined and will eventually affect the calculation of taxes. Federal income taxes will only be payable by the ethanol business entity if it is structured as a corporation. A Limited Liability Company (LLC) or a farmer cooperative business structure would have no tax liability. The LLC and farmer cooperative are by far the more popular forms of business structure for ethanol projects currently under development.

Economic Modeling Results

Ethanol plants of 30, 50 and 70 million gallon per year of anhydrous fuel ethanol production capacity were modeled using BBI's proprietary financial model. Internal Rate of Return (IRR) was used to measure the profitability of the proposed projects. The results for Indiana are summarized in Table 31 and the results for Nebraska are shown in Table 32. More detailed results are shown on the following pages and the 11-year economic forecasts for each plant size are included in the appendix.

Table 31 – Modeling results for the Wheatfield, Indiana site

	30 MMGPY	50 MMGPY	70 MMGPY
Internal Rate of Return (IRR)	-5.7%	3.3%	10.7%
Average Annual Net Earnings	$2,783,000	$6,190,000	$10,794,000
Capital Cost per Gallon ($/gal)	$2.18	$1.85	$1.67
Ethanol Plant Capital Cost	$65,521,000	$92,404,000	$116,582,000
Owner's Costs	$8,173,000	$10,732,000	$13,297,000
Total Project Investment	$73,694,000	$103,136,000	$129,879,000
40% Equity	$29,477,600	$41,254,400	$51,951,600

Table 32 – Modeling results for the Grand Island, Nebraska site

	30 MMGPY	50 MMGPY	70 MMGPY
Internal Rate of Return (IRR)	18.6%	23.6%	29.3%
Average Annual Net Earnings	$7,522,000	$12,754,000	$19,188,000
Capital Cost per Gallon ($/gal)	$2.18	$1.85	$1.67
Ethanol Plant Capital Cost	$65,521,000	$92,404,000	$116,582,000
Owner's Costs	$8,096,000	$10,602,000	$13,117,000
Total Project Investment	$73,617,000	$103,006,000	$129,699,000
40% Equity	$29,446,800	$41,202,400	$51,879,600

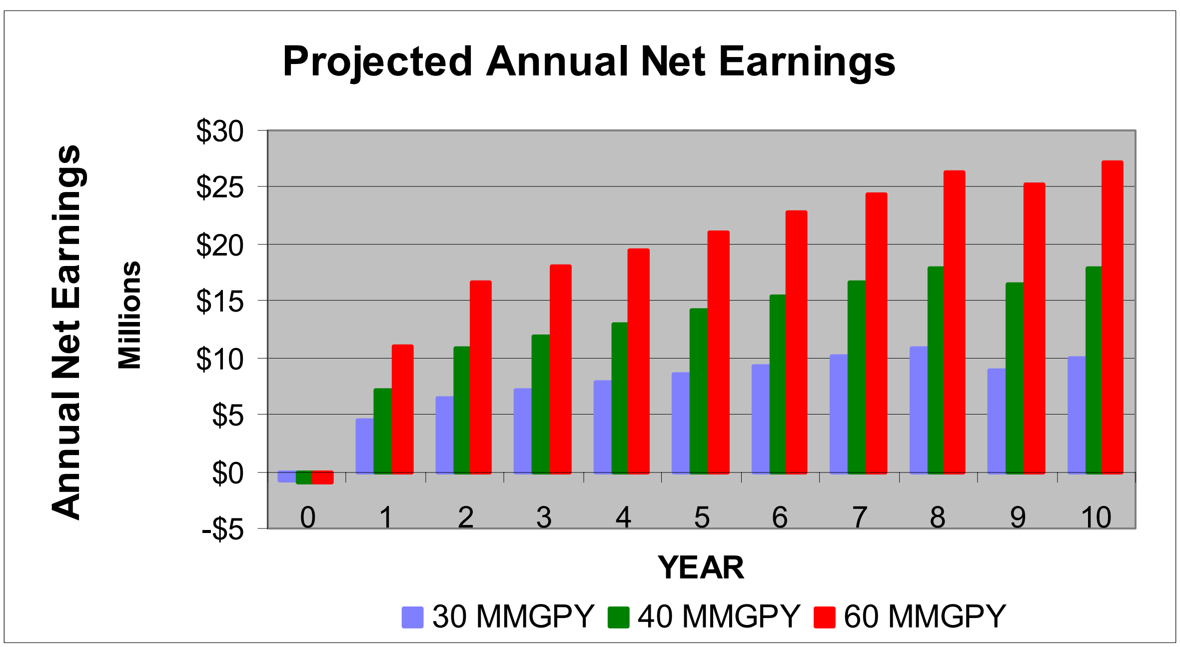
The Capital Cost per Gallon and the Ethanol Plant Capital Cost shown in the above tables includes the installed equipment cost for the ethanol plant plus the cost of a natural gas boiler, ethanol plant engineering, construction management, and a 7% contingency. Both the capital costs and the Owner's costs are discussed in detail in the Design and Cost Estimate Report.

The Internal Rate of Return (IRR) is the present value of the equity investment plus the net increase in cash for years one through ten of the project. The average annual net earnings are also calculated over the 11-year forecast period. The equity investment is assumed to be 40% of the total project cost. Construction of the project is assumed to take 14 months followed by four months of startup. During startup, ethanol production is assumed to be 25% of nameplate capacity during the first month, and then 50%, 75% and finally 100% in the second, third and fourth months of startup. The first principal payment on the debt is assumed to take place in month 19 of the project.

The projected IRRs for the Nebraska project are significantly higher than the Indiana project because of the state producer payment in Nebraska, the lower estimated feedstock cost and the lower energy (steam and electricity) costs at the Nebraska site.

The 70 MMGPY plant in Grand Island, Nebraska has the highest projected IRR at 29.3%. The 50 MMGPY plant has a projected IRR of 23.6% and the 30 MMGPY plant has a projected IRR of 18.6%. IRRs above 25% should attract significant investor interest. The year-by-year annual net earnings for the Grand Island, Nebraska site for each plant size is shown in Figure 5. The net earnings drop slightly in year 9 because the state producer payment ends in that year.

Figure 5 – Year-by-year Projected Annual Net Earnings, Grand Island, NE



The estimated total project investment at the Grand Island, NE site ranges from about $74 million for the 30 MMGPY plant to $130 million for the 70 MMGPY plant. The estimated total project cost for the 50 MMGPY plant is $103 million. The capital cost estimates for the Wheatfield, Indiana site are essentially the same as the Nebraska site.

A summary of the ethanol plant construction and production cost inputs and the proforma income statement for the second year of operation is presented in the following tables.

The cash cost of production and net production costs for each plant size at each site are shown in the following tables. The cash cost of production is defined as the variable costs plus fixed costs minus production credits for co-products. The only co-product credit we have included in the calculations is the lignin residue revenue. The net production cost is defined as the cash cost plus capital depreciation and amortization plus net interest on debt financing.

Table 33 – Cash cost and net production cost for the Wheatfield, IN site

Anhydrous Ethanol Production (Gal/Year)	**30,000,000**	**50,000,000**	**70,000,000**
Wheatfield, Indiana Site			
Variable Production Costs	$0.956	$0.945	$0.940
Fixed Production Costs	$0.123	$0.096	$0.084
Co-Product Credits	($0.073)	($0.073)	($0.073)
Cash Cost of Production	**$1.007**	**$0.969**	**$0.951**
Interest on Debt Financing	$0.114	$0.096	$0.086
Depreciation & Amortization	$0.108	$0.091	$0.082
Net Production Cost	**$1.229**	**$1.156**	**$1.119**

Table 34 – Cash cost and net production cost for the Grand Island, NE site

Anhydrous Ethanol Production (Gal/Year)	**30,000,000**	**50,000,000**	**70,000,000**
Grand Island, Nebraska Site			
Variable Production Costs	$0.813	$0.802	$0.797
Fixed Production Costs	$0.123	$0.096	$0.084
Co-Product Credits	($0.036)	($0.036)	($0.036)
Cash Cost of Production	**$0.900**	**$0.862**	**$0.844**
Interest on Debt Financing	$0.114	$0.096	$0.086
Depreciation & Amortization	$0.108	$0.091	$0.082
Net Production Cost	**$1.123**	**$1.049**	**$1.013**

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site

Summary of Production Cost Inputs -- Wheatfield, Indiana Site

Denatured Ethanol Production (Gal/Year)	**31,500,000**	**52,500,000**	**73,500,000**
Anhydrous Ethanol Production (Gal/Year)	30,000,000	50,000,000	70,000,000
Project Costs			
Ethanol Plant Cost per Gallon	$2.18	$1.85	$1.67
Ethanol Plant Engineering & Construction	$65,521,000	$92,404,000	$116,582,000
Inventory - Biomass	$369,000	$615,000	$861,000
Inventory - Chemicals/Denaturant	$129,000	$216,000	$302,000
Inventory - Ethanol & Lignin	$869,000	$1,449,000	$2,028,000
Spare Parts	$500,000	$600,000	$700,000
Startup Costs	$1,000,000	$1,200,000	$1,400,000
Land	$225,000	$225,000	$225,000
Administration Building & Furnishing	$250,000	$300,000	$350,000
Rail Improvements	$500,000	$750,000	$1,000,000
Site Development Costs	$1,000,000	$1,200,000	$1,400,000
Tools and Laboratory Equipment	$250,000	$250,000	$250,000
Organizational Costs	$500,000	$600,000	$700,000
Capitalized Fees and Interest	$2,057,000	$2,865,000	$3,591,000
Working Capital	$524,000	$462,000	$490,000
Estimated Total Project Cost	**$73,694,000**	**$103,136,000**	**$129,879,000**
% Equity Assumed	40%	40%	40%
Equity	$29,477,600	$41,254,400	$51,951,600
Number of Employees	49	60	71
Average Annual Wages	$48,214	$46,350	$45,063
Annual Payroll	$2,362,500	$2,781,000	$3,199,500
Product Values			
Conversion Rate (gal ethanol/BDT)	89.70	89.70	89.70
Delivered Biomass Feedstock ($/BDT)	38.62	38.62	38.62
Ethanol ($/gal)	1.21	1.21	1.21
Ethanol Shipping Cost ($/gal)	0.059	0.059	0.059
Ethanol Sales Commission (% of sales price)	1.0%	1.0%	1.0%
Lignin Residue ($/wet ton)	6.42	6.42	6.42
CO2 ($/ton)	0.00	0.00	0.00
Natural Gas ($/MMBTU)	4.50	4.50	4.50
Electricity ($/kWh)	0.04	0.04	0.04
Denaturant ($/gal)	0.70	0.70	0.70
Purchased Cellulase Enzyme ($/gal ethanol)	0.10	0.10	0.10
Other Chemical Costs ($/gal ethanol)	0.08	0.08	0.08
Makeup Water ($/1000 gal)	0.50	0.50	0.50
Wastewater ($/1000 gal)	1.00	1.00	1.00
Solid Waste Disposal ($/ton)	10.00	10.00	10.00

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site

Proforma Income Statement for Year 2 -- Wheatfield, Indiana Site

Denatured Ethanol Production (Gal/Year)	**31,500,000**	**52,500,000**	**73,500,000**
Revenue	**$/Gal**	**$/Gal**	**$/Gal**
Ethanol	$1.220	$1.220	$1.220
Lignin Residue	$0.073	$0.073	$0.073
Carbon Dioxide	$0.000	$0.000	$0.000
State Producer Payment	$0.000	$0.000	$0.000
Federal Small Producer Tax Credit	$0.035	$0.000	$0.000
Total Revenue	$1.327	$1.292	$1.292
Production & Operating Expenses			
Feedstocks	$0.435	$0.435	$0.435
Purchased Cellulase Enzymes	$0.102	$0.102	$0.102
Other Chemicals	$0.078	$0.078	$0.078
Natural Gas	$0.188	$0.188	$0.188
Electricity	$0.058	$0.058	$0.058
Denaturants	$0.036	$0.036	$0.036
Makeup Water	$0.003	$0.003	$0.003
Effluent Disposal	$0.004	$0.004	$0.004
Solid Waste Disposal	$0.010	$0.010	$0.010
Direct Labor & Benefits	$0.043	$0.032	$0.027
Total Production Costs	$0.956	$0.945	$0.940
Gross Profit	$0.371	$0.348	$0.352
Administrative & Operating Expenses			
Maintenance Materials & Services	$0.035	$0.030	$0.027
Repairs & Maintenance, Wages & Benefits	$0.017	$0.012	$0.010
Consulting Services	$0.001	$0.000	$0.000
Property Taxes & Insurance	$0.045	$0.038	$0.034
Admin. Salaries, Wages & Benefits	$0.021	$0.013	$0.010
Legal & Accounting/Community Affairs	$0.001	$0.001	$0.001
Office/Lab Supplies & Expenses	$0.002	$0.002	$0.002
Travel, Training & Miscellaneous	$0.001	$0.001	$0.001
Total Administrative & Operating Expenses	$0.123	$0.096	$0.084
EBITDA	$0.248	$0.251	$0.269
Less:			
Interest - Operating Line of Credit	$0.001	$0.000	$0.000
Interest - Senior Debt	$0.114	$0.096	$0.086
Interest - Subordinated Debt	$0.000	$0.000	$0.000
Depreciation & Amortization	$0.108	$0.091	$0.082
Annual Net Earnings Before Income Taxes	$0.024	$0.064	$0.100
11-Year Annual Average Net Income	**$2,783,234**	**$6,189,636**	**$10,793,590**
Internal Rate of Return (IRR)	**-5.7%**	**3.3%**	**10.7%**

Note - $/GAL figures are based on annual *anhydrous* ethanol production

NREL Bioethanol Co-Location Study -- Grand Island, NE Site

Summary of Production Cost Inputs -- Grand Island, Nebraska Site

Denatured Ethanol Production (Gal/Year)	**31,500,000**	**52,500,000**	**73,500,000**
Anhydrous Ethanol Production (Gal/Year)	30,000,000	50,000,000	70,000,000
Project Costs			
Ethanol Plant Cost per Gallon	$2.18	$1.85	$1.67
Ethanol Plant Engineering & Construction	$65,521,000	$92,404,000	$116,582,000
Inventory - Biomass	$324,000	$539,000	$755,000
Inventory - Chemicals/Denaturant	$129,000	$216,000	$302,000
Inventory - Ethanol & Lignin	$837,000	$1,395,000	$1,954,000
Spare Parts	$500,000	$600,000	$700,000
Startup Costs	$1,000,000	$1,200,000	$1,400,000
Land	$225,000	$225,000	$225,000
Administration Building & Furnishing	$250,000	$300,000	$350,000
Rail Improvements	$500,000	$750,000	$1,000,000
Site Development Costs	$1,000,000	$1,200,000	$1,400,000
Tools and Laboratory Equipment	$250,000	$250,000	$250,000
Organizational Costs	$500,000	$600,000	$700,000
Capitalized Fees and Interest	$2,057,000	$2,865,000	$3,591,000
Working Capital	$524,000	$462,000	$490,000
Estimated Total Project Cost	**$73,617,000**	**$103,006,000**	**$129,699,000**
% Equity Assumed	40%	40%	40%
Equity	$29,446,800	$41,202,400	$51,879,600
Number of Employees	49	60	71
Average Annual Wages	$48,214	$46,350	$45,063
Annual Payroll	$2,362,500	$2,781,000	$3,199,500
Product Values			
Conversion Rate (gal ethanol/BDT)	89.70	89.70	89.70
Delivered Biomass Feedstock ($/BDT)	33.86	33.86	33.86
Ethanol ($/gal)	1.21	1.21	1.21
Ethanol Shipping Cost ($/gal)	0.069	0.069	0.069
Ethanol Sales Commission (% of sales price)	1.0%	1.0%	1.0%
Lignin Residue ($/wet ton)	3.18	3.18	3.18
CO2 ($/ton)	0.00	0.00	0.00
Steam ($/1000 lbs)	3.00	3.00	3.00
Electricity ($/kWh)	0.03	0.03	0.03
Denaturant ($/gal)	0.70	0.70	0.70
Purchased Cellulase Enzyme ($/gal ethanol)	0.10	0.10	0.10
Other Chemical Costs ($/gal ethanol)	0.08	0.08	0.08
Makeup Water ($/1000 gal)	0.50	0.50	0.50
Wastewater ($/1000 gal)	1.00	1.00	1.00
Solid Waste Disposal ($/ton)	10.00	10.00	10.00

NREL Bioethanol Co-Location Study -- Grand Island, NE Site

Proforma Income Statement for Year 2 -- Grand Island, Nebraska Site

Denatured Ethanol Production (Gal/Year)	**31,500,000**	**52,500,000**	**73,500,000**
Revenue	**$/Gal**	**$/Gal**	**$/Gal**
Ethanol	$1.209	$1.209	$1.209
Lignin Residue	$0.036	$0.036	$0.036
Carbon Dioxide	$0.000	$0.000	$0.000
State Producer Payment	$0.094	$0.056	$0.040
Federal Small Producer Tax Credit	$0.035	$0.000	$0.000
Total Revenue	$1.374	$1.301	$1.285
Production & Operating Expenses			
Feedstocks	$0.381	$0.381	$0.381
Purchased Cellulase Enzymes	$0.102	$0.102	$0.102
Other Chemicals	$0.078	$0.078	$0.078
Steam	$0.113	$0.113	$0.113
Electricity	$0.043	$0.043	$0.043
Denaturants	$0.036	$0.036	$0.036
Makeup Water	$0.003	$0.003	$0.003
Effluent Disposal	$0.004	$0.004	$0.004
Solid Waste Disposal	$0.010	$0.010	$0.010
Direct Labor & Benefits	$0.043	$0.032	$0.027
Total Production Costs	$0.813	$0.802	$0.797
Gross Profit	$0.561	$0.500	$0.488
Administrative & Operating Expenses			
Maintenance Materials & Services	$0.035	$0.030	$0.027
Repairs & Maintenance, Wages & Benefits	$0.017	$0.012	$0.010
Consulting Services	$0.001	$0.000	$0.000
Property Taxes & Insurance	$0.045	$0.038	$0.034
Admin. Salaries, Wages & Benefits	$0.021	$0.013	$0.010
Legal & Accounting/Community Affairs	$0.001	$0.001	$0.001
Office/Lab Supplies & Expenses	$0.002	$0.002	$0.002
Travel, Training & Miscellaneous	$0.001	$0.001	$0.001
Total Administrative & Operating Expenses	$0.123	$0.096	$0.084
EBITDA	$0.438	$0.403	$0.405
Less:			
Interest - Operating Line of Credit	$0.000	$0.000	$0.000
Interest - Senior Debt	$0.114	$0.096	$0.086
Interest - Subordinated Debt	$0.000	$0.000	$0.000
Depreciation & Amortization	$0.108	$0.091	$0.082
Annual Net Earnings Before Income Taxes	$0.215	$0.216	$0.237
11-Year Annual Average Net Income	**$7,521,794**	**$12,754,435**	**$19,187,947**
Internal Rate of Return (IRR)	**18.6%**	**23.6%**	**29.3%**

Note - $/GAL figures are based on annual *anhydrous* ethanol production

Maximum Feedstock Cost

The maximum feedstock cost that the ethanol plant could pay while maintaining a minimum IRR or hurdle rate of 15% with 100% equity is as follows. A 15% IRR with 100% equity is judged by BBI to be the minimum hurdle rate required to attract investor interest in the project. With 60% debt financing the 15% hurdle rate is equal to an IRR of about 22%.

Table 35 – Maximum feedstock cost with 15% hurdle rate and 100% equity

Anhydrous Ethanol Production (Gal/Year)	**30,000,000**	**50,000,000**	**70,000,000**
Wheatfield, Indiana Site			
Maximum feedstock cost ($/BDT) -- with 15% IRR and 100% equity	$20.00	$27.00	$32.00
Grand Island, Nebraska Site			
Maximum feedstock cost ($/BDT) -- with 15% IRR and 100% equity	$31.10	$35.20	$39.00

The maximum feedstock cost that the plant can pay while maintaining the 15% minimum IRR is significantly higher for the Grand Island, NE site compared to the Wheatfield, IN site. The maximum feedstock cost for the Grand Island site is $7 to $11 per BDT higher than the Wheatfield site.

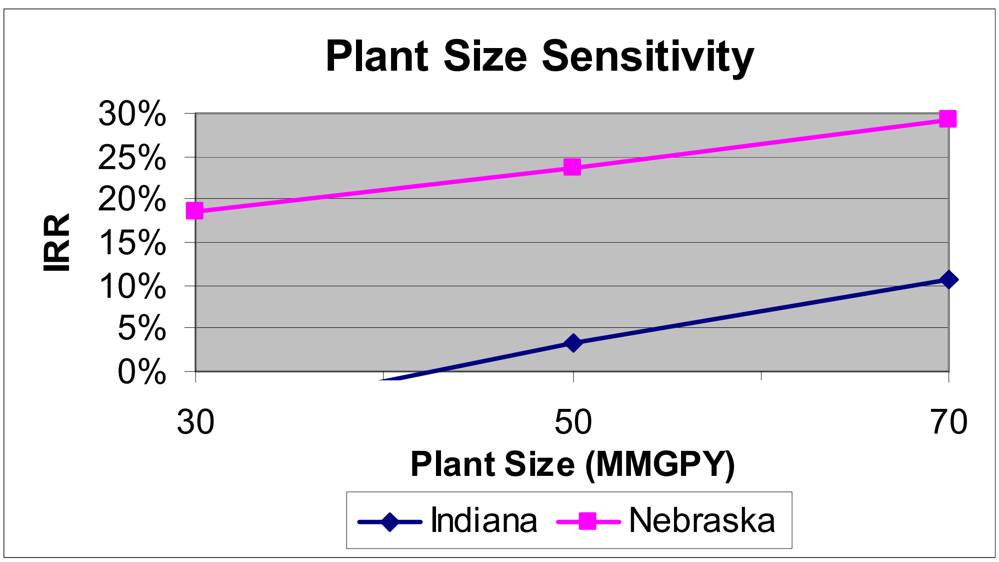
Sensitivity Analysis

The impact on the projected Internal Rate of Return (IRR) will be determined for the following variables:

- Ethanol plant capacity
- Cost of feedstock
- Feedstock composition
- Feedstock inventory (number of days of inventory)
- Ethanol price
- Owner equity
- Capital cost
- Annual manufacturing cost (cash cost of production)
- Annual direct labor cost

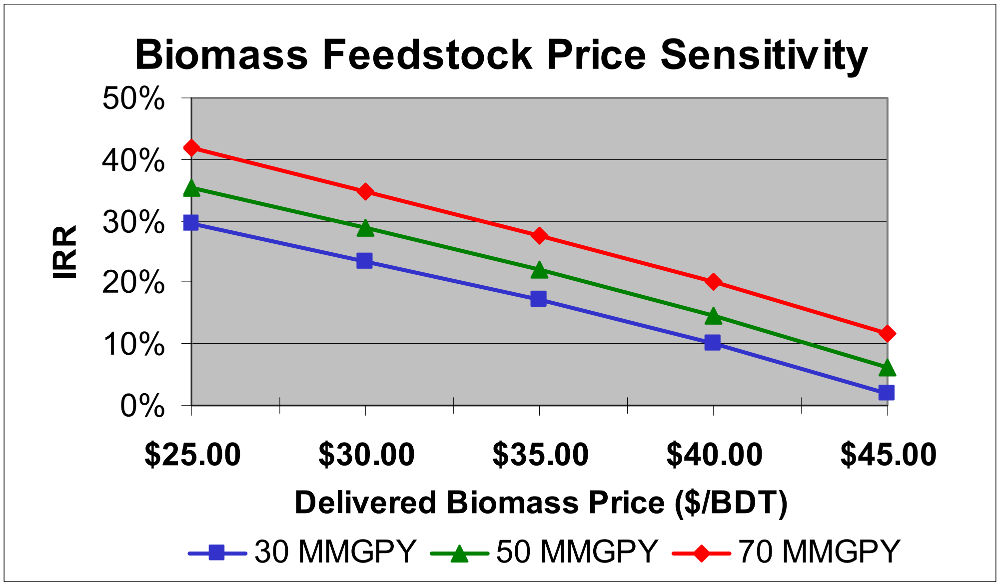
Ethanol Plant Capacity

The impact of ethanol plant sizes from 30 MMGPY to 70 MMGPY on the IRR is shown in the following chart for both the Indiana and Nebraska sites.



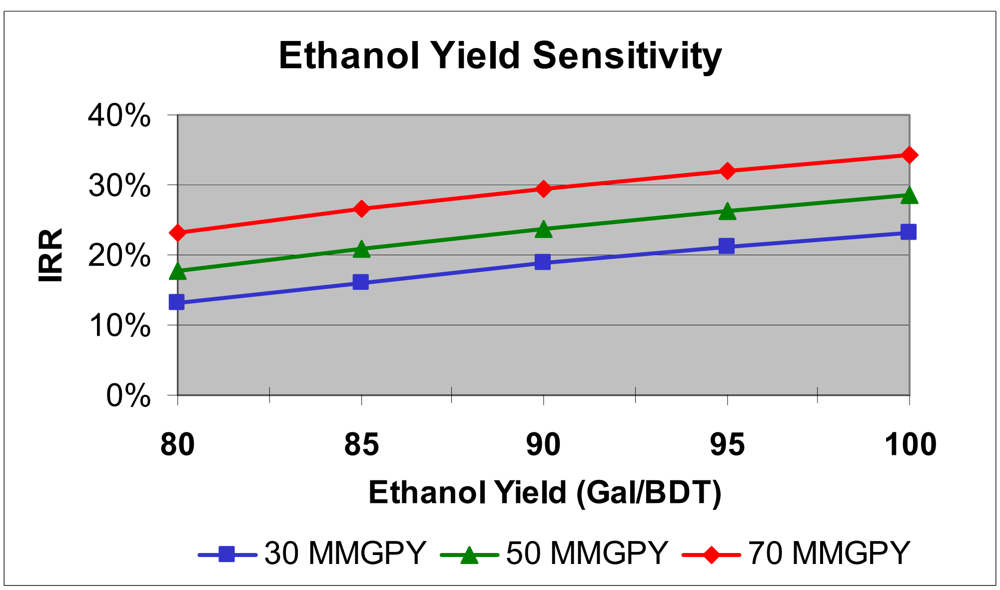
Cost of Feedstock

Based on several studies of corn stover harvest and delivery costs, the delivered price for corn stover could vary from $25 to $45 per BDT. The impact on the IRR over this range of feedstock costs for the Grand Island, Nebraska site is shown in the following chart.



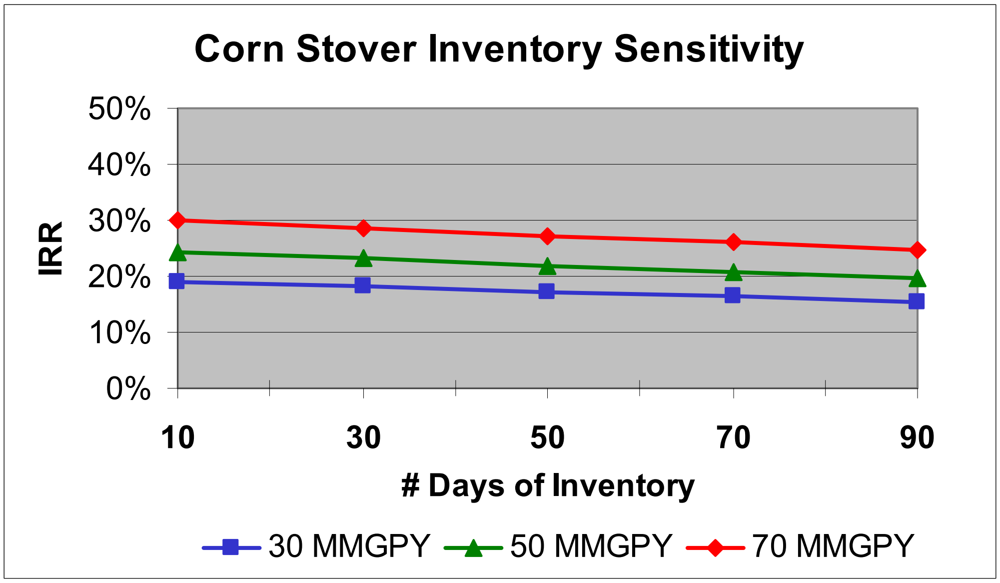
Feedstock Composition

Changes in the cellulose and hemicellulose content of corn stover will impact the ethanol yield from the feedstock. The impact of ethanol yields from 80 gallons per BDT to 100 gallons per BDT is shown in the chart below for the Grand Island, Nebraska site.



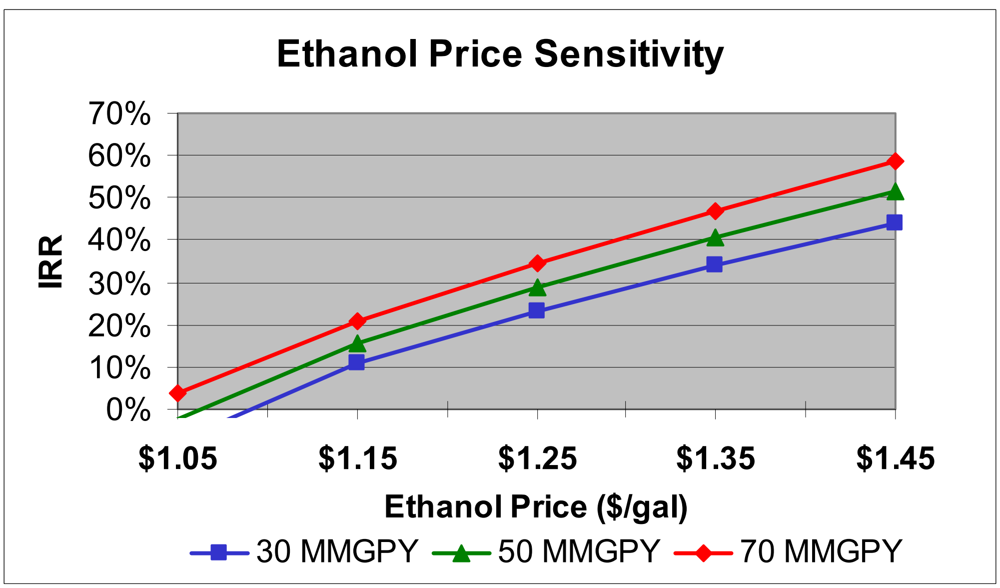
Feedstock Inventory

The number of days of feedstock inventory will impact the project's inventory cost and the initial capital cost of the project. Corn dry mills typically carry ten days of corn inventory. The number of corn stover inventory days will be varied from 10 days to 90 days and the impact on the projected IRR is shown in the chart below.



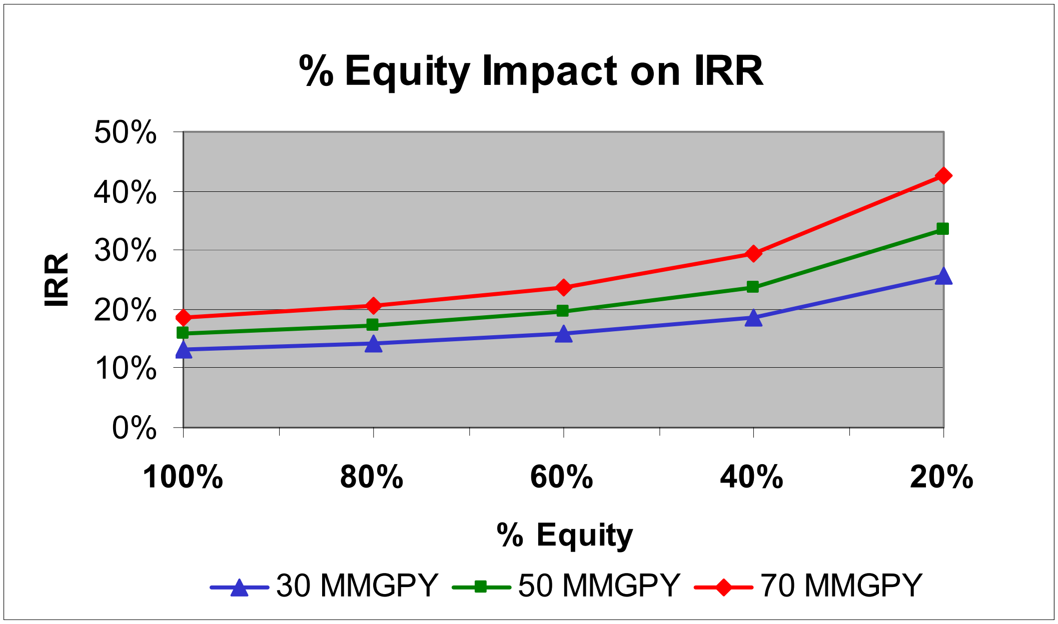
Ethanol Price Sensitivity

Fuel ethanol prices historically range from about $1.00 per gallon to well over $1.40 per gallon. The impact on the IRR over a range of $1.05 to $1.45 is shown in the following chart for the Nebraska site.



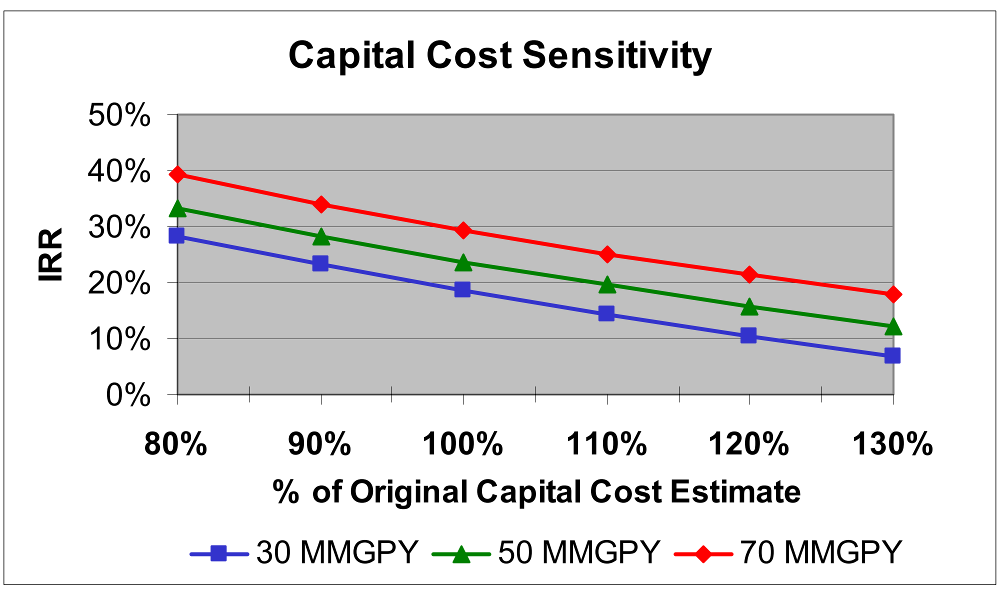
Owner Equity

The impact of varying levels of percent equity is shown in the following chart for the Nebraska project site.



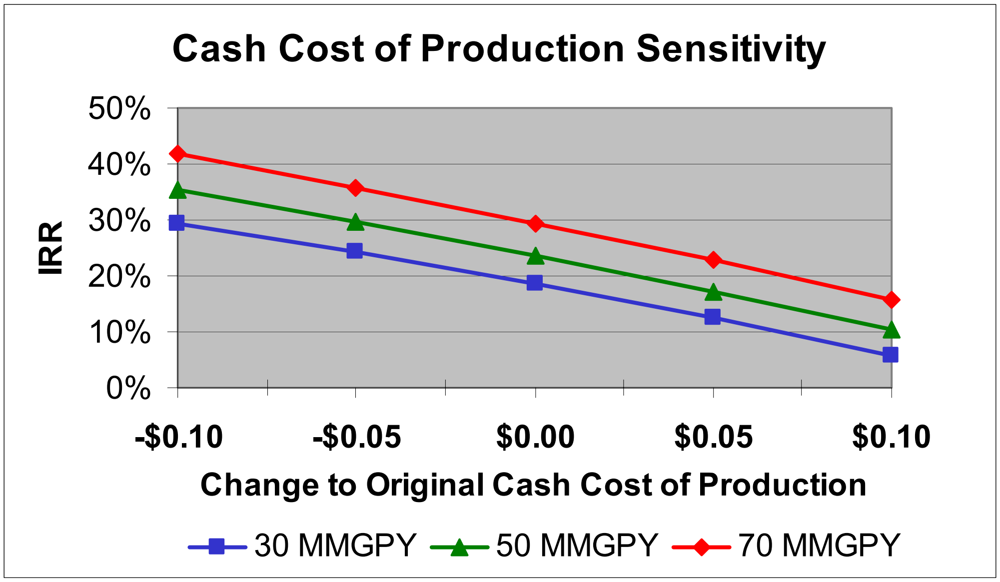
Capital Cost Sensitivity

The impact of varying the capital cost from 80% of the original capital cost estimate to 130% of the original estimate is shown in the chart below for the Nebraska project site.



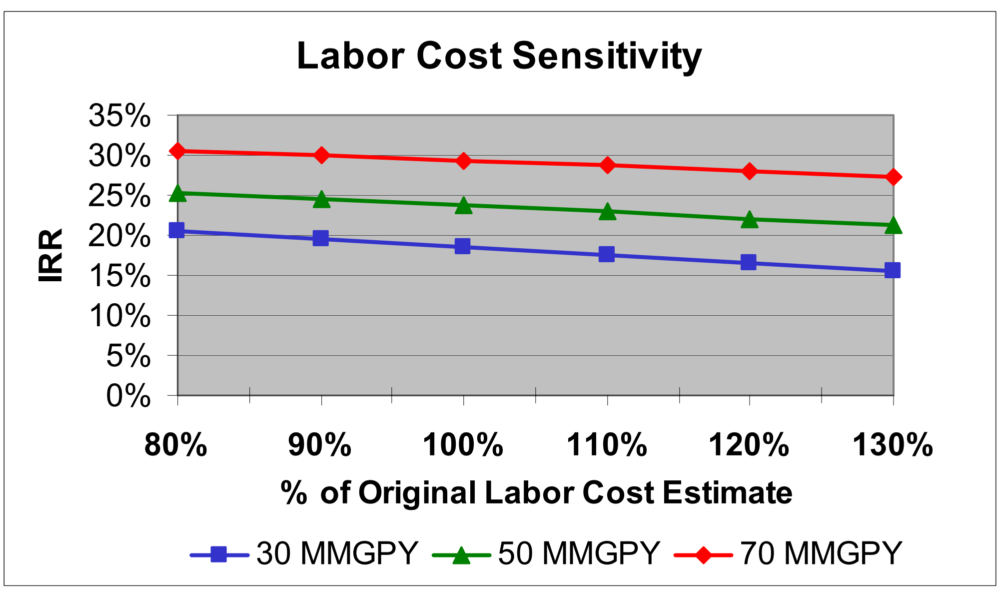
Cash Cost of Production Sensitivity

The impact of varying the cash cost of production by plus or minus 10¢ per gallon of ethanol is shown in the chart below for the Nebraska project site.



Labor Cost Sensitivity

The impact of varying the labor costs from 80% of the original labor cost estimates to 130% of the original estimates is shown in the chart below for the Nebraska project site.



Summary for Sensitivity Analysis

The profitability of the ethanol plant as measured by the IRR is most sensitive to the ethanol price, feedstock price and the percent equity investment. Secondary variables with a relatively high impact include plant capacity, capital cost and cash cost or production (annual manufacturing cost). Variables with relatively minor impact of the IRR include the ethanol yield, number of days of corn stover inventory and the labor cost.

Proformas

The proformas for the Wheatfield, Indiana and Grand Island, Nebraska project sites for ethanol plants of 30, 50 and 70 MMGPY are included in Appendix A.

VI. ENVIRONMENTAL IMPACTS

Potential environmental impacts of siting and operating a commercial-scale bioethanol facility are identified and evaluated in this section of the report. Potential on-site issues will be examined and potential off-site impacts that might require additional investigation will be identified. In this section we will examine the following environmental and community impacts:

On-Site Environmental Issues

- Land-use impacts
    - Wetlands
    - Archeological
    - Endangered species
- Air emissions
- Water use
- Wastewater discharge
- Storm water discharge
- Hazardous chemicals
- Hazardous waste
- Solid waste

Local Community Impacts

- Visual
- Noise
- Odor
- Traffic

Co-location Environmental Impacts and Benefits

- Power plant air permit
- Green power
- NOx reductions
- GHG reductions

Socioeconomic impacts (jobs, income and taxes) due to the proposed bioethanol plants will be evaluated in the next section.

On-Site Environmental Issues

Land Use Impacts

Land use impacts should be relatively minor if the ethanol facility is sited in the proper location. In locals with zoning laws, the site should be zoned industrial. Rural areas are preferred. A corn stover ethanol plant will require approximately the same amount of land as a corn dry mill with additional land for storage of corn stover bales. A good rule of thumb for the amount of land required for a dry mill ethanol plant is ¾ acre for each million gallons of ethanol production capacity. A 30 MMGPY plant would require about 22 acres, a 50 MMGPY plant about 38 acres and a 70 MMGPY plant about 52 acres. Many ethanol project owners purchase significantly more land than indicate here, however. The most important items to consider when regarding the size of the site, is the flow of traffic within the plant and plans for future expansion. The amount of land required for stover bale storage will be determined by the inventory at the site. BBI recommends at least 15 days inventory to avoid possible disruptions in operations.

Wetlands, Endangered Species and Archeological Discoveries

Wetlands and areas with known endangered species and likely archeologically active areas should be avoided when siting the ethanol facility. The U.S. Army Corps of Engineers has approval responsibility for impacts to "waters of the United States" under Section 404 of the federal Clean Water Act. The Corps has generally held to a broad interpretation of the expression waters of the United States, taking it to include all rivers, lakes, ponds, streams and wetlands. For projects with very minor impacts, the primary review is typically performed by the state.

The schedule for approval of Section 404 permits is greatly dependent on the magnitude of the anticipated impacts. Smaller impacts are readily approved and more significant impacts may take as much as 6 months to a year to obtain. In certain instances, the approval process may exceed a year.

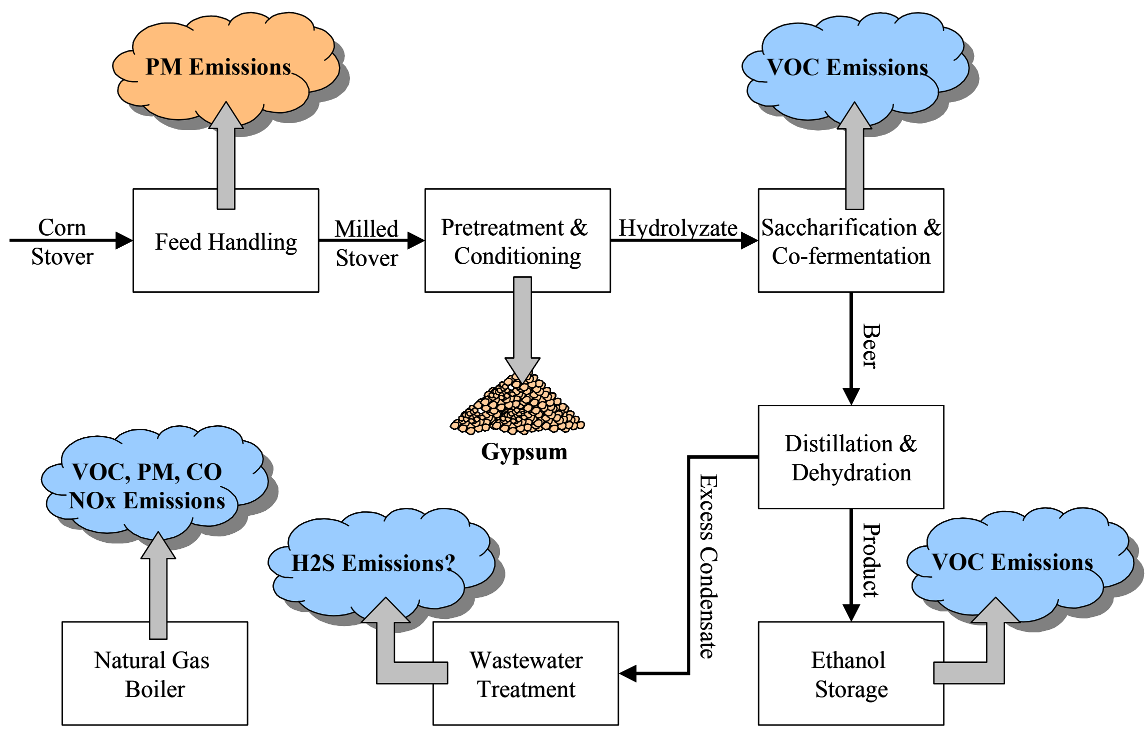
The discovery of an endangered species on or near your site can cause significant delays in a construction project. Discussions with appropriate state agencies and review of endangered species information can help to avoid, but not guarantee that this will not be an issue for an ethanol project.

An archeological survey will be require prior to the start of construction and should be performed before final site selection for the project.

Air Emissions

Air emissions from a corn stover-to-ethanol plant will be similar to the emissions from a corn dry mill ethanol plant. Both facilities will use significant quantities of feedstock that will be delivered by truck (particulate matter – PM emissions). Both grind the feedstock to an appropriate size (PM emissions) prior to “cooking” and saccharification followed by fermentation of the resulting sugars (VOC emissions). Both processes produce a solid residue (potential VOC and PM emissions) and require steam (combustion emissions) to operate the facility. Ethanol product storage and loadout are sources of VOC emissions. If a cooling tower is included in the plant design, it will be a source of particulate emissions. The typical process arrangement and sources of emissions are shown below.

Figure 6 – Major air emissions sources for a bioethanol plant



Due to the interest in building ethanol plants in Nebraska, the Nebraska Department of Environmental Quality has put together information and guidelines specifically for prospective ethanol producers. Other ethanol friendly states, such as Iowa, provide similar ethanol permitting packages. Specific information regarding permits for air, water, emergency planning/right to know and hazardous waste permits is included in the Nebraska packet.

A construction air permit is required prior to beginning construction for an ethanol plant and is transferred to the operational air permit shortly after the plant begins operation and post operational testing has been completed. In states that are familiar with permitting ethanol plants like Nebraska, the construction air permit may take 6 – 12 months to obtain. In states that are unfamiliar with ethanol plants or locations in non-attainment areas, the construction permit could take up to a year or longer to obtain. To ensure that the air permit does not delay the project, follow these recommendations:

- Start early, 12 months prior to start of construction if possible.

- Discuss your project with the state air permitting agency before you submit your application and again after submission.
- Make sure the permit application is complete and accurate.
- Include emission calculations and citations with the permit application.
- Do your research – the ethanol plant design and equipment selection can impact your permit and the required testing, record keeping and reporting requirements.
- Use a qualified air permitting professional familiar with the state.
- Understand the draft and final permits.

The air operating permit program in Nebraska and other states is the result of the Federal Clean Air Act Amendments of 1990. The Federal operating permit program is referred to as the "Title V" operating permit program. The Federal Title V program only regulates major sources of air pollution and state programs typically regulate minor sources of pollution. A source's major/minor status is determined by its emissions, with the larger emitting sources being considered Major and the smaller emitting sources considered Minor.

A Major Source is one that has the potential to emit any air pollutant in quantities greater than 100 tons per year (tpy). Lower thresholds exist for Hazardous Air Pollutants (HAPs) like benzene, mercury and lead. In general a Minor Source is a facility that emits less than 100 tpy of PM, NOx, SOx, VOC or CO; less than 2.5 tpy of any one HAP or 10 tpy of a combination of HAPs; and less than 0.6 tpy of lead.

A flow diagram for the air permitting process is shown in Figure 7. The ethanol plant design engineer's goal should be to end up in one of the two "Source is Minor for Title V and PSD" boxes. If a proposed ethanol plant is a Minor Source, the air permit should be straightforward to obtain and the monitoring and reporting requirements of the permit will be less demanding than a permit for a Major Source.

Ethanol plants have been in the news recently because many are emitting significantly more VOCs and CO than stated in their permit applications. In fact some relatively small plants may be Major Sources for VOCs and CO rather than Minor Sources. Emissions from the distillers grain dryer are in some cases much higher than originally thought. Thermal oxidizers can greatly reduce the dryer emissions and have become standard equipment for new dry mill ethanol plants. Although the proposed bioethanol plants would not likely dry the lignin residue, the current situation describe here points out the need to fully understand the proposed lignocellulosic ethanol process and the resulting emissions.

The single largest emissions source for the proposed bioethanol plants will be the natural gas boiler. Estimated emissions from the boiler were obtained from the Illinois EPA on-line natural gas fired boiler emissions calculator. The on-line calculator uses emission factors from the USEPA for natural gas fired boilers. Priority boiler emissions for 30, 50 and 70 MMGPY bioethanol plants are shown in Table 36.

Table 36 – Estimated emissions from natural gas boiler

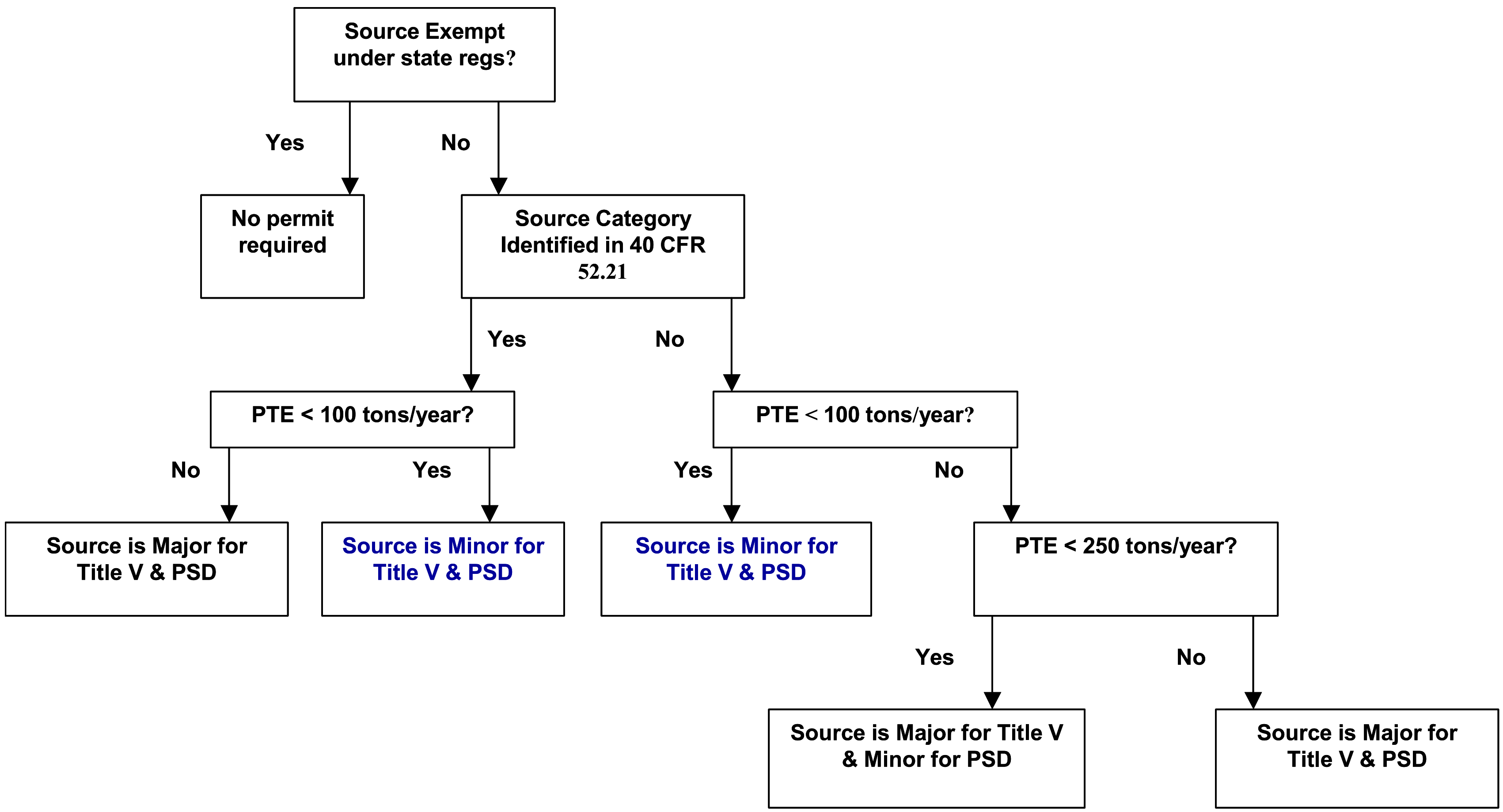
Plant Size	CO	NOx	VOC	PM	SO2
30 MMGPY	52	27	3	5	<1
50 MMGPY	86	45	6	8	<1
70 MMGPY	120	63	8	11	<1

Source: NOx emissions based on 0.044 pounds NOx per million BTUs of boiler input. Other data from Natural Gas Boiler Calculations, Illinois EPA, http://www.epa.state.il.us/air/aer/calculator

Based on just the boiler emission shown in Table 36, the 30 and 50 MMGPY bioethanol plant would be a Minor Source and the 70 MMGPY plant would be Major Source for CO emissions.

In addition to the boiler emissions, other emissions sources for a bioethanol plant will include the fermentation CO2 scrubber vent, other process vents, ethanol and denaturant storage, fugitive emissions, truck and rail loadout, feedstock handling, feedstock milling and truck traffic. The VOC emissions from the CO2 scrubber vent and truck and rail loadout can be significant and the process design in these areas is important in limiting the emissions. Process vents should be routed to an appropriate VOC capture or destruction device (thermal oxidizer or boiler) to limit emissions. Feedstock handling and feedstock milling will create PM emissions and the efficiency of dust collection systems in these areas is an important factor in limiting PM emissions. Truck traffic will increase PM emissions and a dust mitigation program may be needed to suppress road dust.

Figure 7 – Air permit flow chart for criteria pollutants
(source: T. Potas, Environmental Resource Group)



The estimated emissions for a 70 MMGPY dry mill ethanol plant are shown in Table 37. The "Process Vents" and "Truck and Rail Loadout" vents are routed to the Thermal Oxidizer (T.O.), which reduces the VOC emissions by 99%. The importance of treating these sources of emissions is apparent. The "CO2 Scrubber" vent is the discharge from the scrubber that recovers ethanol from the fermenter vents. This vent is not routed to the thermal oxidizer because of the volume of CO2 in the gas stream. The VOC recovery efficiency of the scrubber is an important consideration for this emissions source.

A 70 MMGPY bioethanol plant would have emissions similar to those shown in Table 37 with the exception of the "DDGS Dryer/T.O." emissions source. In a bioethanol plant a lignin residue or natural gas boiler would replace this emissions source. For the design considered in this study, we have assumed that both the Indiana and Nebraska bioethanol plants would include a natural gas boiler. The emissions from a natural gas boiler should not be greater than the DDGS Dryer/T.O. emissions shown in the table. If this is the case, a 70 MMGPY bioethanol plant should be a Minor Source of air emissions. The design and emissions control equipment in the bioethanol facility will have a significant impact on the emissions and could change the classification to a Major Source, however.

Table 37 – Estimated emissions (tpy) for a 70 MMGPY dry mill ethanol plant

Emissions Source	CO	NOX	VOC	PM	HAPs
DDGS Dryer/T.O.	62	68	12	11	<1
Process Vents			3	1	
CO2 Scrubber			32		<1
Fuel Storage			3		<1
Truck & Rail Loadout			14		
Other Equipment			4		
Feedstock Handling				16	
Hammer Mill				6	
Truck Traffic				10	
Totals (tons/year)	62	68	68	32	<1

Source: derived from data from ICM, Inc of Colwich, KS

An important consideration when establishing the size of a bioethanol facility is the amount of air emissions. The facility should be designed to be a Minor Source if possible. The largest emissions sources are likely be the boiler stack and the fermentation CO2 scrubber vent. Control of VOC emissions form truck and rail loadout and other process vents is also important. PM emissions from feedstock handling and milling should be limited by properly designed dust collection systems. With proper attention to the process design and equipment selection, a 70 MMGPY bioethanol facility should be a Minor Source and obtaining a construction air permit should not be a major obstacle to project development.

Water Use

Makeup water required for a bioethanol plant is 536 gallons for each BDT of corn stover processed according to the process design provided to BBI by NREL. Table 38 shows the estimated amount of water required by the proposed bioethanol plants.

Table 38 – Estimated makeup water use for corn stover bioethanol plants

Plant Size	Gal/BDT	GPM	Acre-ft/day
30 MMGPY	536	350	1.55
50 MMGPY	536	600	2.65
70 MMGPY	536	830	3.67

The source of makeup water for both sites will be a new well (or wells). Municipal water is not available at the sites. Well permits are required prior to drilling the wells. Water supply does not appear to be an issue at ether site and potential impacts of the water use shown in the above table is judged to be minimal.

Wastewater Discharge

The amount of wastewater effluent from the proposed bioethanol facilities is shown in Table 39 based on data received from NREL. Approximately 343 gallons of wastewater is produced for every BDT of corn stover processed or 64% of the makeup water. The wastewater effluent is assumed to be treated with a combination of aerobic and anaerobic water treatment processes and the water quality is assumed to meet local water discharge requirements.

Table 39 – Estimated wastewater effluent from a corn stover bioethanol plant

Plant Size	Gal/BDT	GPM	Acre-ft/day
30 MMGPY	536	350	1.55
50 MMGPY	536	600	2.65
70 MMGPY	536	830	3.67

The amount of wastewater produced can vary significantly with the ethanol process design and the quality of the makeup water. The values shown above are estimates only. A municipal water treatment system is not available at either site. Wastewater disposal options include discharge to surface water, use the effluent for irrigation or discharge to an evaporation pond.

A National Pollutant Discharge Elimination System (NPDES) permit is required for direct discharge of wastewater to a receiving stream. The NPDES application should be submitted to the state DEQ at least six months prior to the anticipated discharge of wastewater. Discussion with the state permitting people prior to beginning the ethanol facility design is highly recommended.

For direct discharges to surface waters, the NPDES permit imposes limitations for biochemical oxygen demand (BOD), total suspended solids (TSS), pH, dissolved oxygen, toxicity and possibly nitrogen compounds, metals and other pollutants of concern that could degrade the receiving stream. It is critical that the receiving stream be evaluated prior to siting the new ethanol facility. If the receiving stream is impaired due to pollutants of if there isn't adequate stream data, the issuance of the NPDES permit could be delayed indefinitely while data is collected and Total Maximum Daily Load for the stream is developed.

An NPDES permit is also required for land application of discharge effluent through an irrigation system. The land application site must be an appropriate distance from drinking water wells, surface waters and public areas. The NPDES permit in this case will likely imposes limitations for nitrogen compounds, chloride, conductivity, BOD and TSS.

An ethanol facility that does not discharge wastewater is not required to have an NPDES permit. Use of an evaporation pond typically results in the buildup of sludge in the pond that is periodically removed, however. The disposal of the resulting solid waste would likely be regulated by the state DEQ.

Storm Water

Two permits are required for storm water discharge – one during construction and one for operations. Both permits require the development and implementation of a Storm Water Pollution Prevention Plan. Notice of construction start and finish is required. The construction storm water discharge permit can generally be obtained in Nebraska within 7 days after submitting the application. The operations storm water discharge permit is typically approved within 30 days of submission.

Hazardous Chemicals

The use of certain hazardous chemicals above regulated quantities will trigger Superfund Amendments and Reauthorization Act (SARA) requirements and Emergency Planning and Community Right-to-Know Act (EPCRA) requirements. There are four major sections of SARA Title III:

- Emergency Planning
- Emergency Chemical Release Notification
- Community Right-to-Know Reporting
- Toxic Chemical Release Reporting

Ethanol plants typically are required to file a Risk Management Plan and other requirements of SARA Title II may also apply.

Hazardous Waste

It is not expected that hazardous waste will be produced directly by the corn stover-to-ethanol process. Maintenance operations could produce hazardous waste however, and the following waste streams should be considered as potential sources. A waste determination should be performed when in doubt.

- Distillation still bottom sludges
- Distillation fusel oils
- Sludges from floor drains
- Wastewater treatment sludges
- Strong acids and bases
- Maintenance and office wastes including:
    - Parts washer solvent and sludges
    - Spent oil
    - Cleaning products
    - Fluorescent light bulbs and high intensity discharge lamps
    - Empty aerosol cans
    - Paint wastes and paint solvents
    - Batteries
    - Computer monitors

Maintenance materials and procedures as well as common office materials can impact the generation of hazardous waste and this should be considered when specifying these materials.

Solid Waste

The bioethanol production process as specified by NREL for this project will have only one significant source of solid waste. The detoxification process following pretreatment includes overliming which creates a product stream that is primarily gypsum and other compounds. As currently envisioned the process will not produce gypsum at a purity sufficient for use in other applications such as wall board manufacture. NREL estimates the gypsum stream will be about 80% gypsum. The Georgia Pacific gypsum wallboard plant at the Indiana site requires 95% gypsum for its feedstock. It may be possible to use bioethanol process gypsum byproduct as a soil amendment, but its value in this application is uncertain. We have assumed that the gypsum stream is non-hazardous and will be land filled. The resulting environmental impacts should be minimal. A solid waste disposal permit may be required.

NREL's typical or standard lignocellulosic design for the conversion of corn stover to ethanol includes a boiler to combust the lignin residue. The boiler would produce an ash waste stream requiring disposal. The Indiana and Nebraska bioethanol plants are assumed to sell their lignin residue to the adjacent coal fired power plant, so there is no ash waste stream associated with the bioethanol plant. The bioethanol plant's natural gas fired boiler will not produce an ash waste stream.

Summary of Required Permits

The permits discussed in this section plus additional permits that normally are required for fuel ethanol plants are shown in Table 40. There may be other permits required for specific locals or for "non-standard" plant designs.

Table 40 – Summary of required permits for fuel ethanol plants

Pre-Construction
Wetland Replacement Plan Application
Archeological Survey
Highway Access Permit
Construction Air Permit
Storm Water Construction Permit
Site Zoning Letter
Building Permits
Mechanical
Electrical
Structures
Septic Tank & Drain Field Permit
Fire Protection Permit
Above Ground Storage Tank Permit
Well Application Permit
Joint Utility Location
Pre-Startup
NPDES Storm Water Permit
Storm Water Pollution Plan
NPDES Wastewater Permit
Risk Management Plan
BATF Permit
Post-Startup
Operation Air Permit

Local Community Impacts

Community impacts that require evaluation include visual impacts, noise and possible odors from the ethanol plant as well as increased truck traffic due to corn stover deliveries and shipment of ethanol product.

Siting of the ethanol facility has the greatest influence on the resulting community impacts. Ethanol plants are industrial facilities and should not be located near residential communities. Locations that required feedstock and products to be routed through town should be avoided. Visual impacts are difficult to eliminate because of the size of the facility, but a good site will minimize visual impacts. Scrubbers, carbon absorbers and thermal oxidizers can minimize odor concerns. Special attention should be paid to the wastewater treatment system and the possible generation of hydrogen sulfide with its rotten egg smell, which is detectable at just a few parts per billion.

The proposed site for the Wheatfield, IN bioethanol plant is on the property of the RM Schahfer Generating Station, which is an industrial site in a relatively rural area. There are homes near the proposed site that would be impacted to some degree by the bioethanol facility. The proposed site for the Grand Island, NE bioethanol plant is also in a rural area with the same concerns.

Co-location Impacts and Benefits

Use of the bioethanol lignin residue for boiler fuel in the adjacent coal fired power plant could have both positive and negative impacts on the power plant operations. Most of the comments here are based on feedback from senior management at the RM Schahfer Generating Station in Wheatfield, Indiana.

First and foremost the power plant is not going to use the lignin residue if it will endanger personnel in any way or negatively impact the efficiency or capacity of the power plant. NIPSCO management said a venture involving the use of lignin must improve their bottom line if they are to consider its use.

Steam is unlikely to be available for ethanol production from existing coal fired power plants. The reason is that the boiler and turbine generators are the most expensive part of the power plant and excess capacity is rarely, if ever, built into these systems. Also, the boiler is sized to match the needs of the turbine generator so “excess” steam would not be available and finally, NOx requirements in the air permit could limit the amount of steam generated in a coal-fired facility.

Last but not least, there were major concerns about burning lignin in the RM Schahfer boilers. For obvious reasons, the generating facility is very concerned about the composition and physical characteristics of the fuel being burned in their boiler. The boilers do not have grates, so the lignin must burn quickly and completely. The moisture content of the lignin residue might be too high to accomplish fast and complete combustion. The power plant boilers have had plugging problems when burning wet coal with about 25% moisture. The bioethanol lignin residue as currently designed would have about 50% moisture. There are also concerns about how the lignin would be conveyed to the boiler. Since the RM Schahfer Generating Stations sells its gypsum to Georgia Pacific, there is concern that the introduction of lignin into the boilers could diminish gypsum sales to GP. Impacts on boiler bottom ash and fly ash are also possible concerns.

Potential operational and environmental impacts would have to be well understood before a new fuel such as lignin residue is introduced into the RM Schahfer power plant boilers. Other power plant owners would certainly have the same concerns. A significant testing and research program may be needed before the power plant would use lignin residue for fuel. Large quantities of lignin, which are currently very difficult and expensive to produce, would likely be required for such a program.

Environmental Summary and Recommendations

The air quality permitting for an ethanol plant has gone through a dramatic transformation over the last 18 months. Recent discoveries by the EPA which indicate that air emissions from many ethanol facilities are greater than previously thought will likely result in more stringent regulations. The EPA is currently working with ethanol producers to better define these emissions. Ethanol producers are rapidly implementing new technologies, such as thermal oxidizers, to control emissions in order to come into compliance.

Based on the assumptions stated in this report, and the air permitting regulations in place at the time of this report, the feasibility of obtaining air permits for the proposed bioethanol facilities is excellent. The most significant issue is the boiler emissions for larger bioethanol facilities and remaining a Minor Source. Permitting a Major Source facility will be more difficult, more time consuming and more expensive. Operational monitoring and reporting requirements will also be more expensive.

The timeframe from the preparation of the air permit application to the issuance of an air license is estimated to be approximately 6 to 12 months for a Minor source and more than a year for a Major Source.

Obtaining other permits for the proposed bioethanol facilities should be no more difficult than permitting a corn dry mill ethanol plant. Environmental impacts and community impacts would also be very similar to those for a dry mill. Locating the bioethanol facility away from residential areas can minimize community impacts. An industrial park or land zoned “industrial” may not be suitable if it is near towns and communities. Wetlands and areas with known endangered species and archeologically sensitive areas should also be avoided when siting the ethanol facility.

VII. SOCIOECONOMIC ISSUES

Construction and operation of bioethanol plants in Indiana and Nebraska will create significant economic activity in local communities where the new production facilities are located. The ethanol plant construction and operation will involve expenditures, income, employment and payment of taxes. The expenditures of any business become the income of other businesses or individuals, which in turn is re-spent in the economy to provide income for others. Thus the initial economic activity has a multiplier effect that ripples through the economy. Economic impact analysis is an analytical method that provides a measure of the economic effects of an activity within a specified region.

BBI has estimated the economic impacts of ethanol production from corn stover for 30, 50 and 70 MMGPY bioethanol plant sizes. The final demand impact, household earnings impact and job impacts were estimated by applying the appropriate final demand multipliers calculated by the U.S. Bureau of Economic Analysis for output, earnings, and employment to the estimates of new capital spending and annual operating expenditures associated with the proposed bioethanol plants. The resulting economic impacts are reported as estimated changes in the economic base (final demand), income, jobs and taxes resulting from ethanol production in Indiana and Nebraska.

Analysis Inputs

The inputs required for the economic analysis are the ethanol project direct impacts divided into construction phase impacts and operations phase impacts. This distinction is important because the construction phase impacts are a one-time event while the operations phase impacts are ongoing impacts. Construction phase impacts for the bioethanol plant are assumed to occur over a 16-month construction and startup period, while the operations phase will normally last many years and is characterized by expressing the impacts on an annual basis. This distinction is important because the construction and operations impacts are usually very different in character as well as magnitude. Construction may bring temporary workers into the area that take up temporary residences near the site and therefore have a different impact than the permanent workers and contractors of the operations phase.

The following tables list the analysis inputs for 30, 50 and 70 MMGPY plants based on the estimated cost to construct and operate the proposed corn stover feedstock bioethanol plants at the Indiana and Nebraska sites. The construction and operating costs in the table are discussed in the cost estimate and financial sections of this report.

Operating expenditures include all payments made directly by the ethanol plant owner. These payments include all production and administrative costs projected for the first full year of commercial operation for the project.

Table 41 – Economic Impact Analysis Inputs for Indiana Bioethanol Plant

Construction Phase Impacts	30 MMGPY	50 MMGPY	70 MMGPY
Bioethanol Plant Capital Cost (millions)	$73.7	$103.1	$129.9
Operations Phase Impacts			
Operating Expenditures (millions)	$32.4	$52.1	$71.7
Bioethanol Plant Direct Jobs	49	60	71

Table 42 – Economic Impact Analysis Inputs for Nebraska Bioethanol Plant

Construction Phase Impacts	30 MMGPY	50 MMGPY	70 MMGPY
Bioethanol Plant Capital Cost (millions)	$73.6	$103.0	$129.7
Operations Phase Impacts			
Operating Expenditures (millions)	$28.1	$44.9	$61.6
Bioethanol Plant Direct Jobs	49	60	71

Results

The economic impact analysis results for the Indiana and Nebraska bioethanol plants are presented in the two tables below. There are three primary measures of economic impact presented in the tables, which should be considered separately. These are income, employment and taxes. Income and employment include both indirect and induced impacts. Taxes are estimated for both local and state level based on average tax rates in the Midwest. The results are separated into the construction phase and operations phase impacts. Construction phase and operations phase impacts should be considered separately and should not be added together. Although the impacts are expressed in the same manner, they are not directly comparable.

The construction spending associated with building a 50 MMGPY bioethanol plant will add approximately $250 million to the final demand in the local economy and generate $81 million in new household income and provide for more than 2,500 direct and indirect jobs during construction.

During operations the 50 MMGPY bioethanol plant will create from 534 to 610 new jobs depending upon where the plant is located. New household income will be approximately $17 million annually and annual state and local taxes are estimated to be $1 million on new earnings. The results for the 30 and 70 MMGPY plants are shown in Table 43 and Table 44.

Table 43 – Economic Impacts of Bioethanol Production in Indiana

Construction Phase Impacts	30 MMGPY	50 MMGPY	70 MMGPY
Bioethanol Plant Capital Cost (millions)	$73.7	$103.1	$129.9
Final Demand Impact (millions)	$178.8	$250.3	$315.2
Earnings Impact (millions)	$58.1	$81.3	$102.3
Employment Impacts (indirect jobs)	1,813	2,538	3,196
Operations Phase Impacts	**30 MMGPY**	**50 MMGPY**	**70 MMGPY**
Local Spending (millions)	$32.4	$52.1	$71.7
Final Demand Impact (millions)	$63.5	$102.2	$140.6
Earnings Impact (millions)	$11.3	$18.2	$25.0
Employment Impacts (direct jobs)	49	60	71
Employment Impacts (indirect jobs)	342	550	757
Total Jobs	391	610	828
State & Local Tax on Earnings (millions)	$0.7	$1.1	$1.5

Table 44 – Economic Impact of Bioethanol Production in Nebraska

Construction Phase Impacts	30 MMGPY	50 MMGPY	70 MMGPY
Bioethanol Plant Capital Cost (millions)	$73.6	$103.0	$129.7
Final Demand Impact (millions)	$178.6	$250.0	$314.7
Earnings Impact (millions)	$58.0	$81.1	$102.2
Employment Impacts (indirect jobs)	1,811	2,535	3,192
Operations Phase Impacts	**30 MMGPY**	**50 MMGPY**	**70 MMGPY**
Operating Expenditures (millions)	$28.1	$44.9	$61.6
Final Demand Impact (millions)	$55.1	$88.1	$120.9
Earnings Impact (millions)	$9.8	$15.7	$21.5
Employment Impacts (direct jobs)	49	60	71
Employment Impacts (indirect jobs)	297	474	651
Total Jobs	346	534	722
State & Local Tax on Earnings (millions)	$0.6	$1.0	$1.3

VIII. MARKET ISSUES FOR BIOETHANOL

For each of the project sites we examined the local, regional and national ethanol markets and considered the potential impacts of current policy, legislative, regulatory and market debates. We also compared bioethanol production from corn stover with ethanol produced from dry mill ethanol projects proposed for Nebraska and Indiana and other sites in the Midwest. Modes of ethanol transportation and costs were also evaluated for the Nebraska and Indiana sites.

Market Overview

Currently there are 66 commercial fermentation ethanol production facilities in the United States with 10 new plants under construction (Table 45). Fuel ethanol production capacity in the United States has just recently exceeded two billion gallons annually. Capacity under construction is 345 million annual gallons.

Ethanol's primary purpose is to serve as an octane extender for gasoline, a clean air additive in the form of an oxygenate, and as an aid in the reduction of America's dependence on imported oil, thereby reducing our balance of trade. In order to accomplish these tasks in the face of resistance from the oil industry, Congress established an incentive in the form of a tax credit during the mid-70's designed to encourage the oil industry to blend ethanol. The tax incentive continues today and was recently extended to 2007. It is BBI's opinion that the federal tax incentive will be extended beyond 2007.

The current $0.053 per gallon tax credit is an exemption from the Federal Gasoline Excise Tax paid by gasoline marketers. This tax credit allows gasoline marketers to supply a higher octane, cleaner burning gasoline to their customers and reduce their tax liability in the process. While petroleum-based products are normally the first choice of the oil industry, ethanol is gaining market share as federal clean air standards and short gasoline supplies continue to tighten for gasoline marketers.

New restrictions on automobile emissions, reductions in carbon monoxide, smog mitigation programs in major cities, and a general trend toward the reduction of greenhouse gas emissions, continue to drive the demand for ethanol. Discoveries of ground water contamination by methyl tertiary butyl ether (MTBE), ethanol's primary competitor, have spurred even greater interest in ethanol blends.

The refining capacity in the United States continues to decline while gasoline consumption continues to increase. The slightest upset in refining capacity (fire, shutdown, closure) sends gasoline prices soaring. U.S. refining capacity is not keeping pace with increasing demand. Ethanol plays a key role in helping refiners extend their product by as much as 10%.

MTBE currently has about two-thirds of the oxygenate market in the United States. Since incidences of ground water contamination have occurred in thousands of wells in California and in the Northeast, where MTBE is the predominant oxygenate, there have been demands for the discontinuation of its use. In March 2000 the EPA issued an Advance Notice of Proposed Rulemaking that could result in a total ban of the use of MTBE. Ethanol, a fully biodegradable product, will likely fill the void left in California and other parts of the country where the use of MTBE is banned.

Ethanol demand is expected to increase at a very aggressive pace with current market, environmental and political forces all driving demand for ethanol higher. Today's two billion gallon per year demand is expected to grow to at least five billion gallons by the year 2012. If the use of MTBE is phased out on a national level in the next few years and the RFG oxygenate requirement remains unchanged, a doubling of ethanol demand would occur much sooner.

Table 45 – U.S. Ethanol Production Capacity

COMPANY	LOCATION		FEEDSTOCK	CAPACITY (mmgy)**
A.E. Staley	Loudon	TN	Corn	60
ACE Ethanol*	Stanley	WI	Corn	15
Adkins Energy*	Lena	IL	Corn	40
Ag Processing, Inc.*	Hastings	NE	Corn	52
Agri-Energy, LLC*	Luverne	MN	Corn	20
Alchem LLP	Grafton	ND	Corn	10.5
Al-Corn Clean Fuel*	Claremont	MN	Corn	30
Archer Daniels Midland	Decatur	IL	Corn	950
Archer Daniels Midland	Peoria	IL	Corn	included above
Archer Daniels Midland	Cedar Rapids	IA	Corn	included above
Archer Daniels Midland	Clinton	IA	Corn	included above
Archer Daniels Midland	Walhalla	ND	Corn	28
Broin Enterprises	Scotland	SD	Corn	8
Cargill, Inc.	Blair	NE	Corn	75
Cargill, Inc.	Eddyville	IA	Corn	35
Central Minnesota Ethanol Co-op*	Little Falls	MN	Corn	19
Chief Ethanol	Hastings	NE	Corn	62
Chippewa Valley Ethanol*	Benson	MN	Corn	21
Corn Plus*	Winnebago	MN	Corn	44
Dakota Ethanol LLC*	Wentworth	SD	Corn	45
DENCO, LLC.*	Morris	MN	Corn	20
ESE Alcohol	Leoti	KS	Seed Corn	1.5
Ethanol2000*	Bingham Lake	MN	Corn	28
EXOL, Inc.*	Albert Lea	MN	Corn	38
Glacial Lakes Energy LLC*	Watertown	SD	Corn	40
Golden Cheese Co of California	Corona	CA	Whey	5
Golden Triangle*	Craig	MO	Corn	20
Gopher State Ethanol	St. Paul	MN	Corn	15
Grain Processing Corp.	Muscatine	IA	Corn	10
Heartland Corn Products*	Winthrop	MN	Corn	35
Heartland Grain Fuels LP*	Aberdeen	SD	Corn	8
Heartland Grain Fuels LP*	Huron	SD	Corn	14
High Plains Corporation	York	NE	Corn	50
High Plains Corporation	Colwich	KS	Milo / Corn	20
High Plains Corporation	Portales	NM	Milo	15
J.R. Simplot Company	Caldwell	ID	Potato Waste	3
J.R. Simplot Company	Burley	ID	Potato Waste	3
Land O' Lakes*	Melrose	MN	Cheese Whey	2.5
Manildra Ethanol Corporation	Hamburg	IA	Corn / Wheat Starch	8
Merrick/Coors	Golden	CO	Waste Beer	1.5
Midwest Grain Products, Inc.	Pekin	IL	Corn / Wheat Starch	65
Midwest Grain Products, Inc.	Atchison	KS	Corn / Wheat Starch	25

COMPANY	LOCATION		FEEDSTOCK	CAPACITY (mmgy)**
Miller Brewing	Olympia	WA	Brewery Waste	0.7
Minnesota Corn Processors*	Columbus	NE	Corn	100
Minnesota Corn Processors*	Marshall	MN	Corn	40
Minnesota Energy*	Buffalo Lake	MN	Corn	18
New Energy Corp.	South Bend	IN	Corn	85
Northeast Missouri Grain Processors*	Macon	MO	Corn	21
Northern Lights Ethanol, LLC*	Big Stone City	SD	Corn	40
Permeate Refining	Hopkinton	IA	Sugars & Starches	1.5
Plover Ethanol	Plover	WI	Seed Corn / Whey / Potato Waste	3
Pro-Corn LLC*	Preston	MN	Corn	36
Quad-County Corn Processors*	Galva	IA	Corn	18
Reeve Agri-Energy	Garden City	KS	Corn / Milo	12
Siouxland Energy & Livestock Coop*	Sioux Center	IA	Corn	14
Sunrise Energy*	Blairstown	NE	Corn	7
Sutherland	Sutherland	NE	Corn	15
Tall Corn Ethanol LLC*	Coon Rapids	IA	Corn	40
Tri-State Ethanol Company*	Rosholt	MN	Corn	15
U.S. Energy Partners LLC	Russell	KS	Milo / Wheat Gluten	40
U.S. Liquids	Louisville	KY	Beverage Waste	4
U.S. Liquids	Bartow	FL	Beverage Waste	4
U.S. Liquids	R. Cucamonga	CA	Beverage Waste	4
Williams Bio-Energy	Pekin	IL	Corn	100
Nebraska Energy (Williams Energy)	Aurora	NE	Corn	35
Wyoming Ethanol	Torrington	WY	Corn	5
TOTAL CAPACITY				**2,600**

U.S. ETHANOL PLANTS UNDER CONSTRUCTION

COMPANY	LOCATION		FEEDSTOCK	CAPACITY (mmgy)**
Badger State Ethanol*	Monroe	WI	Corn	40
Great Plains Ethanol LLC	Chancellor	SD	Corn	40
Husker Ag Processing LLC*	Plainview	NE	Corn	20
James Valley Ethanol, LLC	Groton	SD	Corn	45
KAAPA Ethanol, LLC*	Axtell	NE	Corn	40
Little Sioux Corn Processors*	Marcus	IA	Corn	40
Michigan Ethanol LLC*	Caro	MI	Corn	40
Midwest Grain Processors*	Lakota	IA	Corn	45
Northeast Iowa Grain Processors*	Earlville	IA	Corn	15
Pine Lake Ethanol*	Steamboat Rocks	IA	Corn	20
TOTAL CAPACITY				**345**

* Farmer-owned cooperative. ** Million gallons per year. Updated August 12, 2002

Source: BBI International

Local Ethanol Markets

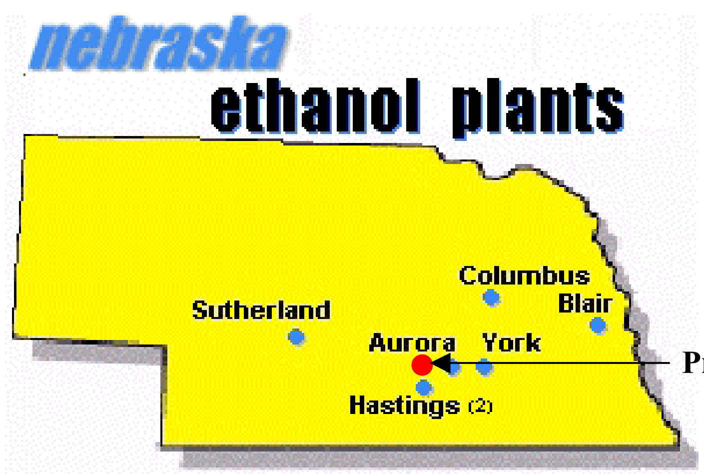
Nebraska

Current fuel ethanol production in Nebraska is 375 million gallons per year while instate use is estimated at about 22 million gallons per year (MMGPY). Nebraska is obviously a net exporter of ethanol. A new 70 MMGPY plant would represent a 19% increase in the state's ethanol production. Ethanol production in Nebraska is shown in Table 46 below. Local markets are likely to be very small and a significant portion if not all of the ethanol from a plant in Grand Island would be shipped out of Nebraska. This should not be a problem for the project as ethanol is shipped to virtually all states in the continental U.S. and there are significant markets to the south and west where the project would enjoy a freight advantage.

Table 46 – Nebraska Ethanol Production

Company	Location	Feedstock	Ethanol Production (MMGPY)
Chief Ethanol Fuels	Hastings	Corn & milo	65
Ag Processing, Inc.	Hastings	Corn & milo	45
Minnesota Corn Processors	Columbus	Corn	80
High Plains Corporation	York	Corn & milo	50
Cargill	Blair	Corn	85
Nebraska Energy, L.L.C.	Aurora	Corn & milo	35
Sutherland Ethanol Company, LLC.	Sutherland	Corn	15
State Total			**375**

Source: BBI International



Proposed Project

Indiana

There is one ethanol plant in Indiana – the New Energy Corporation plant in South Bend with a nameplate capacity of 85 million gallons per year. In-state use is estimated at about 95 million gallons per year. Indiana is a small net exporter of ethanol. A new 70 MMGPY plant would represent about an 82% increase in the state's ethanol production. Local markets for project in Wheatfield, IN are the Chicago and Indianapolis markets. There are significant regional and national markets to the east of the project where IBEC would enjoy a freight advantage.

Regional Ethanol Markets

Typically a regional market is one that is outside of the immediate local market, yet is within the state as well as neighboring states. This market will likely be serviced by rail, and is within a 450-mile radius of the plant.

Nebraska

The regional markets for an ethanol plant in south central Nebraska would include Denver, Kansas City, St. Louis, Chicago, Madison, Milwaukee, Minneapolis, Des Moines, Cedar Rapids, and Omaha. There are other cities within this circle that might also be classified as regional accounts. The plant is well positioned to ship product south to Texas and to the West Coast.

Table 47 – Ethanol Use in Nebraska and Neighboring States

State	Total Ethanol Consumed in 1999 (gallons)
Nebraska	22,127,000
Colorado	47,925,000
Kansas	5,252,000
Missouri	15,257,000
Iowa	70,900,000
South Dakota	19,124,000
Wyoming	-
Total	**180,586,999**

Source: U.S. Department of Transportation Highway Statistics 1999

Generally, the regional market is good business to develop. The freight is reasonable, the competition, while aggressive, is not too severe, and the turn-around time on the rail cars is an advantage. In addition, it is often easier to obtain letters of intent to purchase product from regional buyers than from national buyers. These letters, while not binding, do tend to raise the comfort level of the financial lending institutions. Not surprising in a regional market, letters of intent to purchase are taken quite seriously by the buyer.

The regional market for a Grand Island, NE plant in this case is still in an oversupply situation, however. The ethanol production in Iowa alone is more than the ethanol consumed in the regional market in the above table. Also not included is the rising production from facilities both existing and coming on line in North and South Dakota of approximately 100 million gallons per year.

Regional pricing tends to follow national pricing less the freight difference. As with national markets, the use of a group-marketing program or a broker is advantageous, especially in the first one to three years of operation.

Indiana

The regional markets for an ethanol plant in northwest Indiana would include the greater Chicago area, Milwaukee, Madison, Minneapolis, Kansas City, St. Louis, Memphis, all of Ohio, Pittsburgh and Detroit. There are other cities within this circle that might also be classified as regional accounts.

A plant in Wheatfield, IN would be well positioned to ship product to the east and should have a freight advantage in this regard. Other than New Energy in South Bend, Indiana, the only ethanol production east of Wheatfield is A.E Staley in Louden, TN (45 MMGPY) and Parallel Products in Bartow, FL and Louisville, KY (8 MMGPY combined). Shipping product to the west may be less desirable because there are several very large ethanol plants just to the west in Central Illinois.

Table 48 – Ethanol Use in Indiana and Neighboring States

State	Total Ethanol Consumed in 1999 (gallons)
Indiana	95,281,000
Michigan	35,898,000
Ohio	207,956,000
Kentucky	3,298,000
Illinois	215,565,000
Total	**557,999,999**

Source: U.S. Department of Transportation Highway Statistics 1999

National Ethanol Markets

Recently, California has been the focus of a major ethanol campaign as MTBE is now being phased out. California requested a waiver from the EPA's minimum oxygen requirements for reformulated gasoline in ozone non-attainment areas. The waiver was categorically denied in June 2001, setting off the current expansion plans in the ethanol industry. Shortly, thereafter, Governor Davis announced that he would push back the phase-out of MTBE one year, from January 2003 to January 2004, over concerns of insufficient supply of ethanol. However, most refiners and gasoline marketers in the state (BP Amoco, Shell Oil, Exxon Mobil and Phillips Petroleum) intend to proceed with the replacement of MTBE with ethanol as scheduled (by the end of 2003). ChevronTexaco is the only remaining major refiner in California that hasn't made a definitive public statement regarding their timetable for eliminating the use of MTBE in California.

California is the largest gasoline market in the United States and represents an oxygenate market equivalent to approximately 750 million gallons of ethanol per year. The state has consumed a third of all MTBE used in the U.S. and represents a fifth of all worldwide consumption. It is expected that the requirements to replace MTBE will draw significant U.S. supplies of ethanol to the West Coast.

While there is a great deal of focus on California, another emerging ethanol market is in the Northeast. As in California, the primary drivers are the health and water concerns surrounding the use of MTBE. The market potential for ethanol in the Northeast is estimated at about one billion gallons annually. The ultimate size of the California and Northeast markets will depend on how the RFG oxygenate and MTBE debate plays out in the political arena. Major national ethanol markets are shown in the table below.

Table 49 – Major National Ethanol Markets

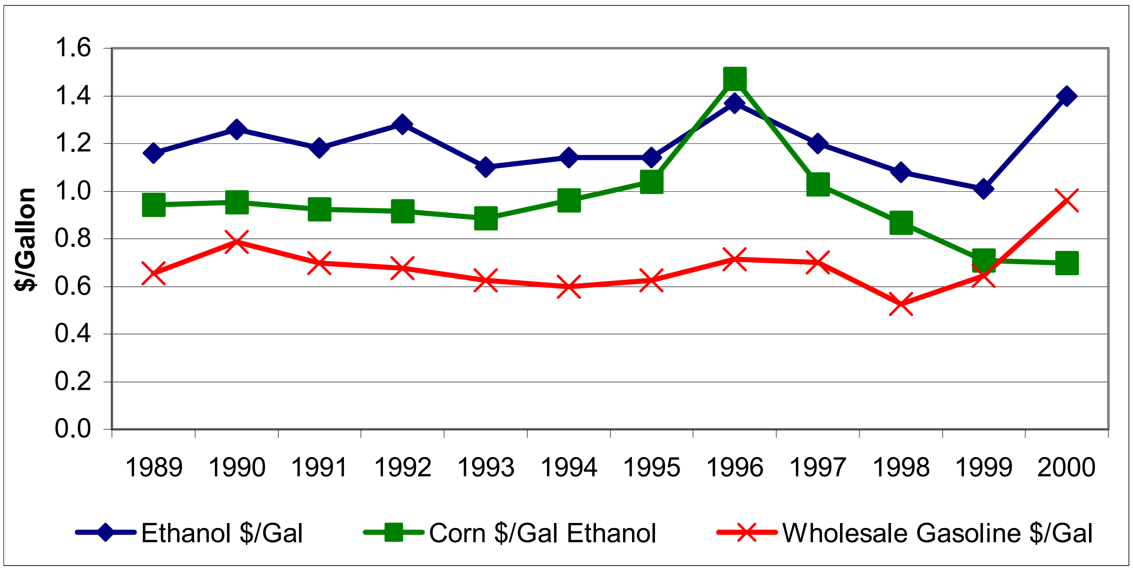
State	Total Ethanol Consumed in 2000 (gallons)
Arizona	15,701,000
California (2000 / Projected)	59,585,000 / 650,000,000
Oregon	12,566,000
Washington	29,996,000
Nevada	25,843,000
Colorado	54,102,000
New Mexico	23,910,000
Michigan	85,007,000
Ohio	211,878,000
Pennsylvania	36,568,000
Texas	58,595,000
Total (2000 / Projected)	**613,851,000 / 1,638,510,000**

Source: U.S. Department of Transportation Highway Statistics 2000

Ethanol Pricing

Historical ethanol, corn and gasoline prices are shown in the following chart. Ethanol prices tend to track the wholesale gasoline price plus the federal tax incentive of 54¢ per gallon (now 53¢ per gallon). In 1996 the ethanol price increased dramatically when high corn prices caused many ethanol plants to curtail operations or shutdown.

Figure 8 – Average U.S. Market Pricing of Ethanol, Gasoline and Corn

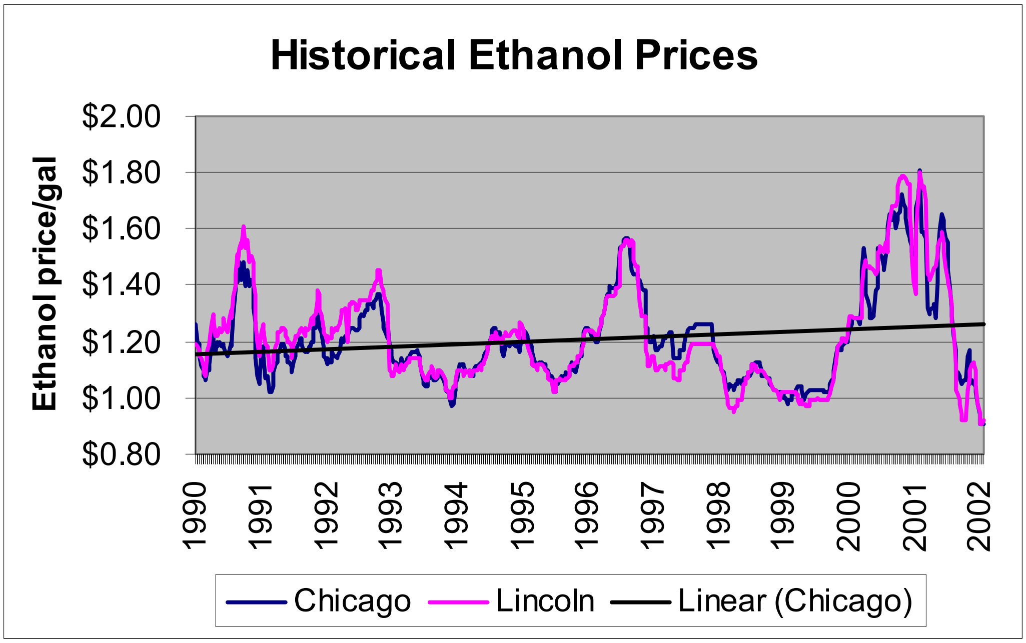


Wholesale Gasoline Data Source: DOE U.S. Refiner Prices of Petroleum Products for Resale
Corn and Sorghum Data Source: USDA. Ethanol Data Source: Hart's Oxy-Fuel News
Prepared by BBI International.

Historical local ethanol pricing is shown in the chart below for the Lincoln, NE and Chicago markets. Weekly spot ethanol pricing published in Oxy Fuel News is shown in the chart. The average ethanol price in the Lincoln market from January 1990 through May of 2002 was $1.22 per gallon. The average price during the same period in the Chicago market was $1.21 per gallon. The trend in ethanol pricing is up as shown by the linear trend line on the chart below.

The market price and value of fuel ethanol depends on a number of variables discussed here. These include its value from volume contribution to gasoline blends, octane enhancement, tax credits, and when applicable, its value as an oxygenate for regulatory compliance. On the other hand, ethanol value is reduced due to its need for special handling (it has a high affinity for water) and its impact on increasing fuel volatility. Ethanol's energy content is also lower than gasoline although this is not reflected in industry value calculations or price formulas. As with any transportation motor fuel or motor fuel component, ethanol prices are also affected by supply and demand. Ethanol pricing and value are not always well synchronized, however.

Figure 9 – Historical ethanol pricing in Chicago, IL and Lincoln, NE



It is important to recognize historical ethanol pricing trends since, to some degree, they contribute to today's ethanol pricing mechanisms and a consequent discounting of ethanol's market value. In the late 1970s and early 1980s, ethanol was originally promoted as a product extender. At that time gasoline prices were relatively high and there were a number of state tax credits (especially in agriculturally oriented Midwestern states) that enabled ethanol to compete with gasoline. Also, at the time there was only, what we call today, conventional gasoline.

Later ethanol was promoted not only as an economical way to extend gasoline supply but also to increase octane. In this manner ethanol was priced comparable to gasoline (net of available tax credits). This enabled marketers to add ethanol to unleaded regular and sell it as a mid-grade or to blend a mixture of unleaded regular and premium sell it as a premium grade. However ethanol production increased dramatically in the 1980s and in order to encourage more widespread use of ethanol, ethanol producers priced much of their product below the price of gasoline (net of tax credits) to encourage blenders and marketers to use it in all three grades (i.e., regular, mid-grade, premium) so as to develop sufficient demand for this increased ethanol supply. This set the stage for a certain amount of octane giveaway on the unleaded regular grade. During this timeframe the pricing mechanism was basically as follows:

$$GP + (10 \times FETC) + (10 \times SC) - MI = \text{Ethanol Price}$$

where:

GP = wholesale or rack gasoline price

FETC = Federal Excise Tax Credit
SC = state credit
MI = margin improvement

Using today's federal gasoline excise tax credit, a \$0.02 state tax incentive and a wholesale gasoline price of \$0.60 and a margin improvement of \$0.01 per blended gallon (i.e. \$0.10 per gallon of ethanol), an example of the formula would be as follows:

$$\$0.60 + (10 \times \$.053) + (10 \times \$0.02) - \$0.10 = \$1.23$$

The example formula allows the blender to improve their product margin by \$0.01 per gallon on the unleaded grade.

During periods of extreme ethanol oversupply, it has not been uncommon for ethanol producers to increase the margin incentives to \$0.02 or more per blended gallon to induce more companies to initiate blending programs. This was usually done on a regional basis with higher margins being offered in states with tax credits. Such markets were also often in states near ethanol plants with lower attendant freight costs. As a result, some of today's strongest major ethanol markets are Midwest states that offer, or formerly offered, state tax incentives. In more distant outlying markets without credits, marketers have traditionally priced ethanol closer to its value for upgrading unleaded regular to mid-grade or premium grade due to the absence of credits and greater freight charges.

In those few instances when ethanol has been in tight supply, it is traditionally priced at parity to unleaded gasoline or slightly higher at which time it would be used to upgrade unleaded regular to mid-grade or to create premium grades similar to the above-mentioned outlying markets.

As ethanol began to see use for its oxygen content to comply with oxygenated and reformulated gasoline programs, the ethanol price was sometimes adjusted upward to reflect its oxygen value. This was done by pricing ethanol off of, but at a discount to, MTBE. Unfortunately since ethanol has not captured the majority of the RFG market, this approach is not as common as the preceding formula although there is some variation depending on market, base fuel, and application. Nonetheless, ethanol pricing must still reflect the need for special handling and in the case of volatility controlled fuels, its negative impact on vapor pressure.

Today, fuel ethanol pricing in the U.S. generally reflects the local cost of unleaded gasoline plus the value of the federal excise tax exemption of \$0.053 per blended gallon plus the value of any local incentive available to the purchaser minus a \$0.01 to \$0.02 per gallon incentive to utilize the product. The producer normally absorbs freight charges. Ethanol pricing in clean air attainment areas is not fully reflective of its full value as an octane enhancer or of its value as an oxygenate additive. Premium pricing based on oxygen content is effective during the mandate periods in certain non-attainment areas such as the Pacific Northwest.

Fuel ethanol production profits are most often a function of the price of gasoline and other competing additives versus the relative "net cost" of feedstock (defined as the cost of feedstock less the value of co-products to the ethanol) plus other variable costs. Wet millers normally have a production cost advantage over dry milling operations due to the higher cumulative value of the wet mill's co-products (corn gluten feed, corn gluten meal and corn oil) over the DDGS co-product of the dry milling process. This advantage has been in the range of $0.10 per gallon of ethanol produced but that has narrowed considerably due to the decreasing trend in prices of the wet milling co-products. In either case, product and feedstock transportation cost advantages and the ability to minimize other variable expenses are essential to successfully competing in the fuel ethanol market.

Ethanol Shipping

Ethanol is typically shipped to markets throughout the country by barge, rail or truck with rail and truck being the most common. Few ethanol plants have access to water and are large enough to carry the inventory needed to fill a barge, let alone a multiple barge tow. A barge has a capacity of 450,000 gallons and up to 15 can be connected on the large waterways for a total volume of 6.75 million gallons. A rail car holds about 30,000 gallons of ethanol and a large semi trailer just under 8,000 gallons.

The shipping costs for the Nebraska and Indiana sites will be estimated here. Neither site in this study has access to water. To determine the approximate division of product shipped by truck and rail, the percentage of ethanol shipped to local, regional and national markets must be determined. Based on the local and regional markets discussed above, BBI recommends the following market apportionment: Nebraska – 0% local (the local market is saturated), 75% regional (Denver, Kansas City, etc.) and 25% national (west coast). Indiana – 50% local (Chicago), 25% regional (Ohio) and 25% national (east coast). The average shipping costs for this market distribution are shown in Table 50.

Table 50 – Average ethanol shipping costs

Nebraska Site	¢/gal	Market %	¢/gal
Local shipping cost	3.0	0%	0.00
Shipping cost to regional markets	5.0	75%	3.75
Shipping cost to national markets	12.6	25%	3.15
Average Shipping Cost			**6.90**

Indiana Site	¢/gal	Market %	¢/gal
Local shipping cost	3.0	50%	1.50
Shipping cost to regional markets	5.0	25%	1.25
Shipping cost to national markets	12.6	25%	3.15
Average Shipping Cost			**5.90**

The shipping rates per gallon of ethanol were estimated as follows. Local shipping is assumed to be by truck up to 150 miles from the ethanol plant. The average local shipping costs are calculated as follows:

4 hrs round trip delivery time x $60/hr ÷ 8,000 gallons = $0.03/gallon

Regional shipping costs are assumed to be by rail up to 450 miles from the ethanol plant. Rail shipping cost will vary with the size of the shipment (number of rail cars) with 100 car "unit trains" having the lowest overall shipping cost. The use of unit trains for shipping ethanol will be impacted by the size of the ethanol facility, the storage capacity of the receiving facility, the grade the unit train must traverse and the needs of the customer. Shipping to national markets is assumed to be to the west coast for the Nebraska site and to the east coast for the Indiana site, resulting in similar shipping distances and costs. Regional and national market rail shipping costs per gallon were estimated as follows:

$1,500 per rail car ÷ 30,240 gallons = $0.05/gallon for regional markets

$3,800 per rail car ÷ 30,240 gallons = $0.126/gallon for national markets

The Wheatfield, IN site has about a 1¢ per gallon in overall shipping cost advantage because it is close to the Chicago ethanol market, currently the largest ethanol market in the country. There are no significant local markets near the Grand Island, NE site, but a large regional market is available for this site mitigating some of the impact of the lack of a local market. If more than 25% of the Grand Island project ethanol is shipped to the west coast, the overall shipping cost for this project will be higher than shown here. Without knowing the marketing alliances that are typically formed by new ethanol producers, it is difficult to know exactly where the ethanol product will be shipped, however.

Government Regulations

The fuel ethanol industry is dependent upon tax policies and environmental regulations which favor the use of the product in motor fuel blends in North America. Government incentives and state and federal regulations that will impact the proposed projects are briefly described below.

Federal Excise Tax Exemption

Ethanol blends have been either wholly or partially exempt from the federal excise tax (FET) on gasoline since 1978. The exemption has ranged from $0.04 to $0.06 per gallon during that 22-year period. Current law provides a $0.053 per gallon exemption from the $0.183 per gallon federal excise tax on gasoline if the taxable product is blended in a mixture containing at least eight per cent alcohol or an approved derivative.

The federal excise tax exemption was revised and extended for the fifth time since its inception as part of highway funding reauthorization legislation (Transportation Efficiency Act of the 21st Century) enacted in June 1998. The new expiration date is December 31, 2007, with the incentive level being calculated in accordance with the following schedule:

Table 51 – Federal excise tax exemption schedule for 10% ethanol/gasoline blends

FET Exemption Schedule (year)	Excise Tax Exemption ($/gal of blended product)
2001 – 2002	$0.053
2003 – 2004	$0.052
2005 – 2007	$0.051

Clean Air Act Amendments of 1990

In November 1990, a comprehensive amendment to the Clean Air Act of 1977 established a series of requirements and restrictions for gasoline content designed to reduce air pollution in identified problem areas of the United States. The two principal components affecting motor fuel content are the Oxygenated Fuels Program, which is administered by the states under federal guidelines, and a federally supervised Reformulated Fuel Program.

Oxygenated Fuels Program

The law requires the sale of oxygenated fuels in certain carbon monoxide non-attainment Metropolitan Statistical Areas (MSA) during at least four winter months, typically November through February. Any additional MSA not in compliance for a period of two consecutive years in subsequent years may also be included in the program. The EPA Administrator is afforded flexibility in requiring a shorter or longer period of use dependent upon available supplies of oxygenated fuels or the level of non-attainment.

Reformulated Gasoline

The Clean Air Amendments established special standards effective January 1, 1995 for the most polluted ozone non-attainment areas: Los Angeles Basin, Baltimore, Chicago Area, Houston Area, Milwaukee Area, New York-New Jersey, Hartford Region, Philadelphia Area and San Diego, with provisions to add other areas in the future if conditions warrant (Sacramento was added later). At the outset of the program there were a total of 96 Metropolitan Statistical Areas not in compliance with Clean Air standards for ozone.

The legislation requires a minimum of 2.0% oxygen in reformulated gasoline as a means of reducing ozone pollution and replacing octane lost by reducing aromatics. The Reformulated Gasoline Program also includes a provision which allows individual states to "opt into" the federal program by request of the governor, to adopt standards promulgated by California which are stricter than federal standards, or to offer alternative programs designed to reduce ozone levels. Nearly all of the Northeast and middle Atlantic areas from Washington, D.C., to Boston not under the federal mandate have "opted into" the federal standards.

These government mandates in recent years have created a variety of U.S. gasoline grades to meet different regional environmental requirements. Reformulated gasoline accounts for about 30% of nationwide gasoline consumption. Oxygenated gasoline for carbon monoxide control accounts for less than 10 percent of the nationwide total even during the October to March gasoline season. It is important to note that the mandate to supply these different grades regionally and seasonally has imposed a significant reduction in gasoline distribution flexibility, because gasoline can no longer be interchanged from one region to another, or held over from winter to summer. This lack of flexibility was one of the important contributors to the gasoline price spike experienced during 2000.

MTBE

Methyl Tertiary Butyl Ether or "MTBE" is a high octane, water tolerant ether produced by the reaction of refinery isobutylene with methanol supplied from sources outside the refinery. It provides one way to use methanol indirectly in motor fuel without the problems associated with use of methanol directly. Because it is a refinery-based product and also does not absorb water (a characteristic that has historically prevented ethanol shipment in pipelines), MTBE has been the oxygenate of choice to satisfy environmental and octane enhancing needs outside the ethanol producing area of the Midwest.

MTBE's blending characteristics are very similar to hydrocarbons, making it acceptable for blending at the refinery and subsequent shipment through pipelines. The first MTBE plant in the U.S. commenced operations in 1979. The EPA originally permitted a 7% by volume concentration of MTBE in unleaded gasoline and later raised the limit to 15%. The total demand for MTBE in the U.S. for 1998 was reported at 203,200 barrels per day; 99.5% for use as a fuel additive and the balance of 0.5% for use as a chemical intermediate and solvent.

MTBE's use as a major additive in U.S. gasoline is ending because of ground water contamination issues discovered in most states. The EPA has announced its intention to list MTBE as a toxic substance and begin the process of requiring its removal from gasoline. California and 17 other states have enacted regulations or legislation requiring its removal during the 2003 to 2005 period (see map below).

California requested a waiver from the EPA's minimum oxygen requirements for reformulated gasoline in ozone non-attainment areas. The waiver was categorically denied in June 2001, setting off the current expansion plans in the ethanol industry. Shortly, thereafter, Governor Davis announced that he would push back the phase-out of MTBE one year, from January 2003 to January 2004, over concerns of insufficient supply of ethanol. However, most refiners and gasoline marketers in the state (BP Amoco, Shell Oil, Exxon Mobil and Phillips Petroleum) are fully intending to proceed with the replacement of MTBE with ethanol as scheduled (by the end of 2003). ChevronTexaco is the only remaining major refiner in California that hasn't made a definitive public statement regarding their timetable for eliminating the use of MTBE in California gasoline.

California is the largest gasoline market in the United States and represents an oxygenate market equivalent to approximately 750 million gallons of ethanol per year. The state has consumed a third of all MTBE used in the U.S. and represents a fifth of all worldwide consumption. It is expected that the requirements to replace MTBE will draw significant U.S. supplies of ethanol to the West Coast.

Figure 10 – States Requiring the Removal of MTBE

Source: BBI International

Concurrent with the activities surrounding MTBE is the request that Congress enact legislation modifying the Clean Air Act Amendments to eliminate the minimum oxygen requirement in RFG altogether, and to substitute some sort of requirement for the continued use of ethanol at current levels. A number of bills have been introduced to either eliminate MTBE and/or the oxygen standard in RFG and some to only eliminate MTBE and require that oxygen or a renewable content be present under the revised standards. The eventual outcome from all of this is widely expected to create substantial new opportunities for fuel ethanol – the issue is what the level of demand will be once the requirements of the enabling legislation are known. The EPA has gone on record as supporting the current and potentially expanded use of ethanol in RFG.

Policy Market Drivers

Renewable Fuels Standard

The U.S. Senate version of the Energy Policy Act of 2002 (S 517) includes Section 820 commonly called the Renewable Fuels Standard (RFS). The House version of the energy bill does not include RFS language. At the time of this writing, this difference must be resolved in Conference Committee.

As a nation, we have consistently acted on our commitment to having cleaner air in our urban areas. It is likely that some form of cleaner gasoline will be mandated through this legislation either through a Renewable Fuels Standard or through some form of continuation of the RFG Programs. The following section provides a summary of the important aspects of Senate Bill S 517, Section 820 that are relevant to ethanol marketing. The final language of the Conference Committee energy bill will significantly impact the future of an ethanol plant and should be carefully assessed when the bill becomes law and the language is finalized.

The Senate RFS provides for a required ramp up of renewable fuels use starting in 2004 with 2.3 billion gallons and gradually increasing to 5 billion gallons in 2012. After 2012, the 2012 ratio of 5 billion gallons to actual gas consumption is used for subsequent years. Table 52 shows the amounts of renewable fuels that would be required each year under the Senate RFS.

Table 52 – Renewable Fuels Standard

Senate Renewable Fuels Standard Schedule as of 6/9/02									
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Billion gallons per year	2.3	2.6	2.9	3.2	3.5	3.9	4.3	4.7	5.0

The Senate RFS language requires that "...gasoline sold or dispensed to consumers in the United States, on an annual average basis, contains the applicable volume of renewable fuel.... but shall not restrict where renewables can be used, or impose any per-gallon obligation for the use of renewables." The bill also states that the regulations "shall contain compliance provisions for refiners, blenders, and importers…" The direct requirements apply only to gasoline. Biodiesel can be used for credit trading so biodiesel producers will have to sell their credits (at whatever price the market will bear) to benefit.

Cellulosic derived ethanol is credited higher at 1.5 gallon versus one gallon of non-cellulosic ethanol. It will take a number of years for cellulosic ethanol and biodiesel production to ramp up enough to impact the RFS. These two sources could have some impact on the RFS in later years of the program. These provisions also provide opportunities for starch based ethanol plants to add future cellulosic ethanol production with significant economic benefits.

The bill also provides provisions for credit trading which is summarized here. The Senate bill states: "...that any person who refines, blends, or imports gasoline that contains a quantity of renewable fuel that is greater than the quantity required under paragraph (2)... may use the credits or transfer all or a portion of the credits to another person, for the purpose of complying with paragraph (2)" (Note: Paragraph (2) has the compliance ramp-up table). Credit is good in the calendar year it is generated and in the next calendar year and may be good for an additional year if the RFS Program "Administrator" allows it in the regulations. So a company not in compliance can ramp up renewable fuel use in the next year (and maybe two years) and/or purchase credits from persons using renewable fuels at a rate over the required rate. The regulations do not apply to small refineries with average daily production of under 75,000 barrels per day until Jan. 1, 2008. Such small refineries can announce their early participation and opt-in and sell their credits for the following year. The "Administrator" can also set up regulations applying to the "Regulation of excessive seasonal variations." Ethanol plants that are located near a robust ethanol market may benefit from a stronger market from these provisions when refiners and blenders purchase ethanol and also benefit when prices are good in the credit trading market.

An important consideration regarding the RFS and the credit trading provisions contained in the legislation is the potential for ethanol sales in the Northeast. While some have suggested that many refiners and marketers in the Northeast may opt to trade credits rather than purchase ethanol, that logic fails to take into account some of the primary drivers behind ethanol use.

The refining capacity in the United States continues to decline, while gasoline consumption continues to increase. The slightest upset in refining capacity (fire, shutdown, closure) sends gasoline prices soaring. This is because the U.S. refining capacity is barely keeping pace with increasing demand. Ethanol plays a key role in helping refiners extend their product by as much as 10%. Even though the Northeast currently has some excess refining capacity, refining shortfalls in other regions of the country continue to put pressure on the Northeast refiners. This ethanol market driver, while significant in other areas of the U.S., may not be as pronounced in the Northeast.

Second, the need for clean octane continues to grow in many parts of the country. Clean air standards will remain in place whether we have an oxygenate requirement in reformulated gasoline or not. Ethanol provides as much as three octane points to the gasoline into which it is blended. In addition to the octane, it helps refiners meet clean air requirements by reducing, through dilution, other various toxic components in gasoline.

Third, is the issue of MTBE, which will undoubtedly be phased out. Refiners know that, and are making plans to quickly move away from MTBE all across the country. The obvious remaining liquid fuel choice is ethanol.

Finally, the ability of petroleum marketers to increase margins makes ethanol a sound business choice. So while it may take some time for a full switch to ethanol to occur, it is becoming increasingly apparent that in the years ahead ethanol will be the octane enhancer, fuel extender, and MTBE replacement in America's gasoline.

The Senate RFS contains two other important provisions that can impact the market for a future ethanol plant. The bill eliminates (within 270 days after the bill passes) the oxygen requirements for Reformulated Gasoline (Section 833). The bill also proposes the elimination of MTBE in four years with the exception that a state can choose to continue to use MTBE at a 0.5% level (Section 834).

The phase out of MTBE will likely have a significant positive impact on the ethanol market, because ethanol is the most likely product that would be used to replace MTBE as it is phased out. MTBE and ethanol extend the volume of gasoline, enhance octane, and provide oxygen. Ethanol as an octane enhancer can substitute for benzene and other aromatic hydrocarbons. This substitution reduces the emissions of benzene and butadiene, both of which are carcinogenic. To date, the use of ethanol as an octane enhancer on the West Coast and in the Northeast has been limited due to lack of regional availability and the ready availability of MTBE. If ethanol is locally available at a competitive price, it is likely to be a preferred product to substitute for MTBE as it is phased out. In addition, a series of lawsuits filed in numerous states against oil companies who have used MTBE and as a result contaminated groundwater have made many wary of its continued use.

Ethanol would provide several significant benefits to blenders and refiners. It could be used to substitute for MTBE, reducing emissions and increasing octane, and also to meet the requirements of the RFS as it ramps up. The phase out of MTBE is likely to serve as a bridge in the marketing of ethanol as the RFS requirements ramp up.

E85 Market

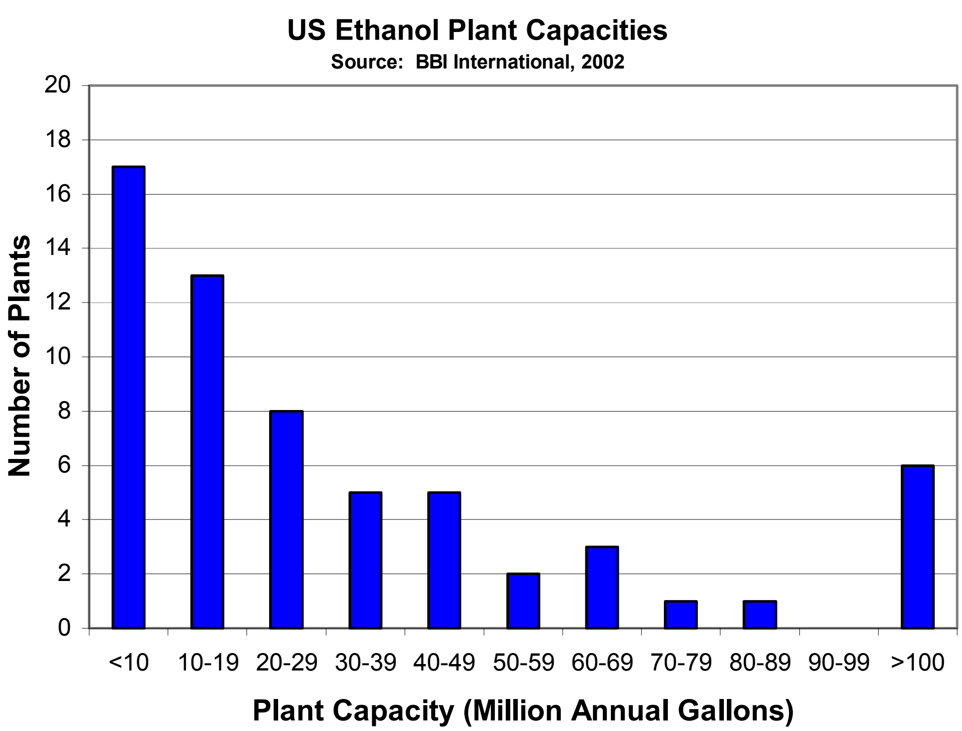
The other developing market for ethanol is the E85 market. E85 is a blend of approximately 15% gasoline and 85% ethanol. The use of E85 requires the installation of additional infrastructure to dispense the product. The installation of E85 infrastructure is largely a political and marketing issue. The State of Minnesota has made a significant commitment to installing E85 infrastructure and currently has over 40 E85 stations. E85 represents a significant market potential but due to the difficulty in predicting the rate at which gasoline marketers will incorporate the equipment into their retail outlets and uncertainties regarding the continuation of CAFE credits, it is difficult to predict how fast the market might grow. It is important to note that legislation currently under consideration as part of the energy bill provides a very favorable environment for the growth of E85.

Competition

The largest ethanol producer in the U.S. (and the world) is Archer Daniels Midland (ADM), with four large wet mill plants in Illinois and Iowa with a total production capacity of about 950 million gallons per year. ADM also owns a small dry mill ethanol plant in Walhalla, North Dakota. The ADM wet milling process produces ethanol at a relatively low average cost per gallon due to economies of scale and the fact that the costs are spread over a greater number of value-added products made from corn (gluten feed, gluten meal, corn germ, corn oil, corn sweetener, etc.). ADM also captures additional profits from peripheral activities to ethanol production, such as ethanol transportation and corn handling. However, their older plants lack some of the newer technologies, which enable newer plants to compete on a cost basis despite their smaller size.

The remaining producers in the ethanol industry are smaller players. Including ADM, there are only six facilities in the U.S. capable of producing 100 million gallons per year or more. With a design capacity of 70 million gallons per year, the proposed bioethanol plant will be larger than all but eight of the current 66 operating ethanol plants. The plant would also be larger than all 10 ethanol plants under construction. The bioethanol plant will have a significant advantage due to economies of scale. See the figure below for a breakdown in the ethanol industry by plant size.

Figure 11 – U.S. ethanol plant distribution by capacity



Comparison with Midwest Ethanol Plants

The financial forecast for the 50 and 70 MMGPY bioethanol plant at the Grand Island, NE site with corn stover feedstock presented in the previous sections is compared to corn dry mill ethanol projects under development in Nebraska, Illinois and Indiana. The results are shown in Table 53.

The capital cost expressed on a dollar per gallon basis to design and build the cellulosic ethanol plant is much higher than the 40 MMGPY plants under development in the Midwest. The capital cost for the cellulosic plant is $1.85 for the 50 MMGPY plant and $1.67 for the 70 MMGPY plant. The 40 MMGPY corn dry mills are about $1.20 per gallon. These costs are for the ethanol plant and do not include the owner's costs. Owner's costs are about 10% of the ethanol plant cost.

Product values and financial assumptions are very similar for each of the projects with the exception of the feedstock price and by-product (lignin or DDGS) values. The 5-year average corn price has been used for each of the Midwest projects resulting in a feedstock cost of $1.97 in Nebraska and $2.07 in Indiana. The estimated cost of corn stover in Nebraska is $33.86 per BDT. The lignin residue has a relatively low value at $3.18 per wet ton versus $80 to $85 per ton for DDGS in the Midwest.

Ethanol sales price was set at $1.21 per gallon in Nebraska and $1.20 per gallon in Indiana and Illinois. Ethanol shipping costs are $0.07 per gallon in Nebraska and Indiana and $0.05 per gallon in Illinois.

Discussions with CO_2 companies indicate that the CO_2 could likely be sold from the Indiana dry mill plant, but not the other plants. CO_2 markets must be evaluated on a case-by-case basis.

The financial forecast for the corn stover project in Grand Island, NE shows a 21.0¢ per gallon net income before taxes for the 50 MMGPY plant size and 23.1¢ per gallon net income for the 70 MMGPY plant size. This compares very favorably to the dry mill projects shown. The cellulosic plant is not as competitive as the Nebraska dry mill at 28.3¢ per gallon net income, but more competitive than the Indiana and Illinois dry mills at 17.2¢ and 18.5¢, respectively. It should be noted that the Nebraska plants include the current state producer payment of 18¢ per gallon on the first 16,625,000 gallons produced each year for eight years.

The key differences in the cellulosic ethanol financials and the dry mill financials is the feedstock cost which is heavily in favor of the corn stover plant with feedstock at 38¢ per gallon of ethanol versus 74 to 78¢ for corn feedstock. On the other hand, the cellulosic plant is projected to have much higher chemical costs (18¢ per gallon versus 8¢ per gallon). The higher capital cost for the cellulosic plant also translates into higher costs for interest and depreciation (17-19¢ per gallon versus 12¢ per gallon), as well as slightly higher property taxes and maintenance costs.

At this time there is more uncertainty in the cellulosic financial forecasts because many of the capital cost estimates and performance criteria (ethanol yield for example) are unproven at commercial scale. Cellulase enzyme is not currently available for 10¢ per gallon of ethanol as assumed in the projections. The forecast for the corn stover plant is based in large part on DOE/NREL goals for improvements to the current dilute acid pretreatment/enzymatic hydrolysis technology. The corn dry mill estimates are based on operating plants and state of the art dry mill plants under construction. The costs and performance criteria used for the dry mill estimates are typically guaranteed by the dry mill process design and construction companies and the level of risk associated with these projections is quite small.

Table 53 – Comparison of cellulosic and dry mill ethanol projects

	Grand Island, NE Corn Stover	Grand Island, NE Corn Stover	Nebraska Dry Mill	Indiana Dry Mill	Illinois Dry Mill
Anhydrous Ethanol Production (GPY)	50,000,000	70,000,000	40,000,000	40,000,000	40,000,000
Project Costs					
Cost per Gallon	$1.85	$1.67	$1.20	$1.20	$1.19
Ethanol Plant Engineering & Construction	$92,404,000	$116,582,000	$48,000,000	$48,000,000	$47,750,000
Project Development/Owner's Costs	$10,602,000	$13,117,000	$5,040,000	$6,720,000	$7,260,000
Total Project Cost	$103,006,000	$129,699,000	$53,040,000	$54,720,000	$55,010,000
Product Values					
Conversion Rate (Gal Ethanol/ton or Bu)	89.70	89.70	2.67	2.67	2.67
Feedstock ($/BDT or $/Bu)	33.86	33.86	1.97	2.07	2.09
Ethanol ($/Gal)	1.21	1.21	1.21	1.20	1.20
Ethanol Shipping Cost ($/Gal)	0.07	0.07	0.07	0.07	0.05
Lignin Residue or Distillers Grain ($/Ton)	3.18	3.18	85.00	85.00	80.00
CO2 ($/Ton)	0.00	0.00	0.00	8.00	0.00
Denaturant ($/Gal)	0.70	0.70	0.70	0.70	0.70
Steam ($/1000 lbs) or Natural Gas ($/MCF)	3.00	3.00	4.00	4.50	3.80
Electricity ($/kWh)	0.03	0.03	0.035	0.035	0.035
Proforma Income Statement for Year 2					
Sales	**$/Gal**	**$/Gal**	**$/Gal**	**$/Gal**	**$/Gal**
Ethanol	$1.209	$1.209	$1.209	$1.199	$1.221
Lignin or DDGS	$0.036	$0.036	$0.270	$0.270	$0.251
Carbon Dioxide	$0.000	$0.000	$0.000	$0.024	$0.000
State Producer Payment	$0.056	$0.040	$0.070	$0.000	$0.000
Total Sales	$1.302	$1.286	$1.549	$1.493	$1.472
Production & Operating Expenses					
Feedstocks	$0.381	$0.381	$0.738	$0.775	$0.783
Chemicals, Enzymes & Yeast	$0.180	$0.180	$0.081	$0.081	$0.081
Steam or Natural Gas	$0.113	$0.113	$0.163	$0.174	$0.143
Electricity	$0.043	$0.043	$0.036	$0.036	$0.029
Denaturants	$0.036	$0.036	$0.036	$0.036	$0.036
Makeup Water Supply	$0.003	$0.003	$0.002	$0.002	$0.003
Effluent Treatment & Disposal	$0.004	$0.004	$0.002	$0.004	$0.003
Solid Waste Disposal	$0.010	$0.010	$0.000	$0.000	$0.000
Production Labor & Benefits	$0.032	$0.027	$0.024	$0.026	$0.023
Total Production Costs	$0.802	$0.797	$1.081	$1.134	$1.100
Gross Profit	$0.500	$0.489	$0.468	$0.359	$0.372
Administrative & Operating Expenses					
Maintenance Materials & Services	$0.030	$0.027	$0.021	$0.021	$0.023
Repairs & Maintenance, Wages & Benefits	$0.012	$0.010	$0.007	$0.007	$0.006
Consulting Services	$0.000	$0.000	$0.000	$0.000	$0.000
Property Taxes & Insurance	$0.038	$0.034	$0.018	$0.018	$0.018
Admin. Salaries, Wages & Benefits	$0.013	$0.010	$0.013	$0.013	$0.013
Legal & Accounting/Community Affairs	$0.001	$0.001	$0.001	$0.001	$0.001
Office/Lab Supplies & Expenses	$0.002	$0.002	$0.002	$0.002	$0.001
Travel, Training & Miscellaneous	$0.001	$0.001	$0.001	$0.001	$0.001
Total Administrative Expenses	$0.096	$0.084	$0.062	$0.062	$0.063
EBITDA	$0.404	$0.405	$0.407	$0.298	$0.309
Less:					
Interest - Senior Debt	$0.096	$0.086	$0.062	$0.064	$0.064
Depreciation & Amortization	$0.091	$0.082	$0.062	$0.062	$0.060
Annual Net Earnings Before Income Taxes	$0.216	$0.237	$0.283	$0.172	$0.185

Conclusion for the Ethanol Market

As described previously, ethanol pricing is affected primarily by the rack price of gasoline and state and federal incentives. However, an oversupply in local markets can necessitate a discounted price or higher transportation costs to get the product to a market with unsatisfied demand.

The primary market drivers for fuel ethanol in the U.S. are MTBE replacement, a Renewable Fuels Standard, federal and state tax incentives, octane requirements and the Reformulated Gasoline program.

The phase out of MTBE will have a significant positive impact on the ethanol market, as ethanol is the most likely product that will be used to replace MTBE as it is phased out. MTBE and ethanol extend the volume of gasoline, enhance octane, and provide oxygen. Ethanol, as an octane enhancer, can substitute for benzene and other aromatic hydrocarbons. This substitution reduces the emissions of benzene and butadiene, both of which are highly carcinogenic.

To date, the use of ethanol as an octane enhancer in both California and the Northeast has been limited due to lack of regional availability and readily available MTBE. As MTBE is phased out (and BBI believes it will be), ethanol is very likely to be the preferred product to substitute for MTBE. In addition, a series of lawsuits filed in numerous states against oil companies who have used MTBE (resulting in contaminated groundwater) has made many wary of its continued use.

The Senate version of the energy bill provides for a required ramp up of use of renewable fuels like ethanol. The bill if signed into law, would require 2.3 billion gallons in 2004 and gradually increases to 5 billion gallons in 2012. It is important to note that in addition to ethanol, other renewable fuels such as biodiesel are also included in the Senate Bill. Credit trading will impact renewable fuels use on the East and West coasts and a premium for the use of cellulosic ethanol may also impact the ethanol market.

The refining capacity in the United States continues to decline, while gasoline consumption continues to increase. The slightest upset in refining capacity (fire, shutdown, closure) sends gasoline prices soaring. U.S. refining capacity is not keeping pace with increasing demand. Ethanol plays a key role in helping refiners extend their product by as much as 10%.

The need for clean octane continues to grow in many parts of the country. Clean air standards will remain in place whether we have an oxygenate requirement in reformulated gasoline or not. Ethanol provides as much as three octane points to the gasoline into which it is blended. In addition to the octane, it helps refiners meet clean air requirements by reducing, through dilution, various toxic components in gasoline.

The ability of petroleum marketers to increase profits $0.01 per gallon of gasoline sold or more makes ethanol a solid business choice. So while it may take some time for a full switch to ethanol to occur, it is becoming increasingly apparent that in the next decade ethanol will be the octane enhancer, fuel extender and MTBE replacement in our gasoline.

APPENDIX

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	31,500,000
Anhydrous Ethanol Production (gal/yr)	30,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0590	$0.0602	$0.0614	$0.0626	$0.0639	$0.0651	$0.0664	$0.0678	$0.0691	$0.0705	2.00%
State Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	
Delivered Biomass Price ($/BDT)	$38.620	$39.006	$39.396	$39.790	$40.188	$40.590	$40.996	$41.406	$41.820	$42.238	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$6.420	$6.484	$6.549	$6.615	$6.681	$6.748	$6.815	$6.883	$6.952	$7.022	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0400	$0.0408	$0.0416	$0.0424	$0.0433	$0.0442	$0.0450	$0.0459	$0.0469	$0.0478	2.00%
Natural Gas Use (MMBTU/BDT)	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	
Natural Gas Price ($/MMBTU)	$4.5000	$4.5900	$4.6818	$4.7754	$4.8709	$4.9684	$5.0677	$5.1691	$5.2725	$5.3779	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	49	49	49	49	49	49	49	49	49	49	
Average Salary Including Benefits	$48,214	$49,420	$50,655	$51,922	$53,220	$54,550	$55,914	$57,312	$58,744	$60,213	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$51,949,000		
Engineering Expense	$4,979,617		
Construction Management	$4,005,921		
Contingency	$4,586,489		
Total	$65,521,000	$2.18	per gallon

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Owner's Costs	
Inventory - Biomass	$369,000
Inventory - Chemicals/Denaturant	$129,000
Inventory - Ethanol & Lignin	$869,000
Spare Parts	$500,000
Startup Costs	$1,000,000
Land	$225,000
Administration Building & Furnishing	$250,000
Rail Improvements	$500,000
Site Development Costs	$1,000,000
Tools and Laboratory Equipment	$250,000
Organizational Costs	$500,000
Capitalized Fees and Interest	$2,057,000
Working Capital	$524,000
Total Estimated Project Cost	$73,694,000

Tax Incentives ($/gal)

Year	Blenders Credit Federal	Blenders Credit State	State Producer Payment
1	$0.052	$0.000	$0.000
2	$0.052	$0.000	$0.000
3	$0.051	$0.000	$0.000
4	$0.051	$0.000	$0.000
5	$0.051	$0.000	$0.000
6	$0.051	$0.000	$0.000
7	$0.051	$0.000	$0.000
8	$0.051	$0.000	$0.000
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.000
Annual payment cap	$0
State incentive duration, years	0

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

Senior Debt		
Principal	$44,216,400	60.00%
Interest Rate	8.0%	fixed
Lender Fees	$442,164	1.000%
Placement Fees	$0	0.000%
Amortization Period	10	years
Cash Sweep	0.000%	
Subordinated Debt		
Principal	$0	0.00%
Interest Rate	0.00%	
Lender Fees	$0	0.000%
Placement Fees	$0.00	0.000%
Amortization Period	0	years
Common Equity Investment		
Total Equity Amount	$29,477,600	40.00%
Placement Fees	$0	0.000%
Preferred Shares	$0	0.000%
Common Shares	$29,477,600	100.000%
Grants		
Amount	$0	0.00%

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	0	270,733	1,315,747	2,716,290	4,480,240	6,615,561	9,130,302	12,032,587	15,330,611	19,032,632
Accounts Receivable - Trade	0	1,087,058	1,107,733	1,129,265	1,151,222	1,173,612	1,196,443	1,219,724	1,243,465	1,267,674	1,292,360
Inventories											
Feedstock	0	738,079	745,460	752,915	760,444	768,048	775,729	783,486	791,321	799,234	807,226
Purchased Enzymes	0	129,600	130,896	132,205	133,527	134,862	136,211	137,573	138,949	140,338	141,742
Other Chemicals	0	99,386	100,380	101,383	102,397	103,421	104,455	105,500	106,555	107,620	108,697
Denaturant	0	30,000	30,600	31,212	31,836	32,473	33,122	33,785	34,461	35,150	35,853
Finished Product Inventory	0	842,567	886,186	903,412	920,978	938,889	957,154	975,779	994,772	1,014,139	1,033,888
Total Inventories	0	1,839,632	1,893,522	1,921,127	1,949,182	1,977,694	2,006,672	2,036,123	2,066,057	2,096,482	2,127,406
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	2,926,689	3,271,988	4,366,140	5,816,694	7,631,546	9,818,676	12,386,150	15,342,109	18,694,766	22,452,397
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	58,160,880	68,021,027	68,121,027	68,221,027	68,321,027	68,421,027	68,521,027	68,621,027	68,721,027	68,821,027	68,921,027
Less Accumulated Depreciation & Amortiz.	0	1,480,790	4,524,235	7,572,680	10,626,125	13,684,570	16,748,015	19,816,460	22,889,905	25,968,350	29,051,795
Net Property, Plant & Equipment	58,160,880	66,540,237	63,596,792	60,648,347	57,694,902	54,736,457	51,773,012	48,804,567	45,831,122	42,852,677	39,869,232
Capitalized Fees & Interest	967,808	2,052,853	1,847,567	1,642,282	1,436,997	1,231,712	1,026,426	821,141	615,856	410,571	205,285
Total Assets	59,353,689	71,744,779	68,941,347	66,881,769	65,173,593	63,824,714	62,843,114	62,236,858	62,014,087	62,183,013	62,751,914
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	484,580	503,710	509,053	514,455	519,918	525,442	531,028	536,676	542,387	548,163
Notes Payable	0	376,454	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	3,173,311	3,436,694	3,721,938	4,030,857	4,365,417	4,727,744	5,120,144	5,545,114	6,005,356	2,110,575
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	4,034,345	3,940,404	4,230,991	4,545,313	4,885,335	5,253,186	5,651,172	6,081,790	6,547,743	2,658,737
Long Term Debt (excluding current maturities	30,644,732	39,063,839	35,627,145	31,905,206	27,874,349	23,508,932	18,781,188	13,661,044	8,115,930	2,110,575	0
Subordinated Debt (excluding current maturiti	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities	30,644,732	43,098,184	39,567,549	36,136,197	32,419,662	28,394,267	24,034,375	19,312,216	14,197,720	8,658,318	2,658,737
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600	29,477,600
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(768,644)	(831,005)	(103,801)	1,267,972	3,276,331	5,952,847	9,331,140	13,447,042	18,338,767	24,047,096	30,615,577
Total Capital Shares & Equities	28,708,956	28,646,595	29,373,799	30,745,572	32,753,931	35,430,447	38,808,740	42,924,642	47,816,367	53,524,696	60,093,177
Total Liabilities & Equities	59,353,689	71,744,779	68,941,347	66,881,769	65,173,593	63,824,714	62,843,114	62,236,858	62,014,087	62,183,013	62,751,914

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	26,833,908	36,592,857	37,324,714	38,071,208	38,832,633	39,609,285	40,401,471	41,209,500	42,033,690	42,874,364
Lignin Residue	0	1,600,488	2,177,792	2,199,570	2,221,566	2,243,782	2,266,220	2,288,882	2,311,771	2,334,888	2,358,237
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Federal Small Producer Payment	0	824,644	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000
Total Sales	0	29,259,039	39,820,649	40,574,285	41,342,775	42,126,414	42,925,505	43,740,353	44,571,271	45,418,579	46,282,601
Production & Operating Expenses											
Feedstocks	0	10,694,462	13,045,552	13,176,007	13,307,767	13,440,845	13,575,254	13,711,006	13,848,116	13,986,597	14,126,463
Purchased Cellulase Enzymes	0	2,331,000	3,054,240	3,084,782	3,115,630	3,146,787	3,178,254	3,210,037	3,242,137	3,274,559	3,307,304
Other Chemicals	0	1,787,563	2,342,190	2,365,612	2,389,268	2,413,161	2,437,292	2,461,665	2,486,282	2,511,145	2,536,256
Utilities - Natural Gas	0	4,257,717	5,633,996	5,746,675	5,861,609	5,978,841	6,098,418	6,220,386	6,344,794	6,471,690	6,601,124
Electricity	0	1,313,500	1,738,080	1,772,842	1,808,298	1,844,464	1,881,354	1,918,981	1,957,360	1,996,508	2,036,438
Denaturants	0	809,375	1,071,000	1,092,420	1,114,268	1,136,554	1,159,285	1,182,471	1,206,120	1,230,242	1,254,847
Makeup Water	0	69,132	90,581	91,487	92,402	93,326	94,259	95,202	96,154	97,115	98,087
Wastewater Disposal	0	88,376	115,796	116,954	118,124	119,305	120,498	121,703	122,920	124,149	125,391
Solid Waste Disposal	0	223,082	292,298	295,221	298,173	301,155	304,167	307,208	310,280	313,383	316,517
Direct Labor & Benefits	0	1,264,950	1,296,574	1,328,988	1,362,213	1,396,268	1,431,175	1,466,954	1,503,628	1,541,219	1,579,749
Total Production Costs	0	22,839,156	28,680,307	29,070,989	29,467,753	29,870,706	30,279,955	30,695,613	31,117,792	31,546,607	31,982,176
Gross Profit	0	6,419,883	11,140,343	11,503,295	11,875,021	12,255,709	12,645,549	13,044,740	13,453,479	13,871,972	14,300,426
Administrative & Operating Expenses											
Maintenance Materials & Services	0	800,880	1,054,565	1,070,383	1,086,439	1,102,736	1,119,277	1,136,066	1,153,107	1,170,403	1,187,959
Maintenance - Wages & Benefits	0	494,100	506,453	519,114	532,092	545,394	559,029	573,005	587,330	602,013	617,063
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	233,544	1,167,718	1,348,658	1,302,092	1,254,357	1,205,434	1,155,301	1,103,939	1,051,327	997,444	942,268
Admin. Salaries, Wages & Benefits	148,500	603,450	618,536	634,000	649,850	666,096	682,748	699,817	717,312	735,245	753,626
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	72,000	72,000	73,440	74,909	76,407	77,935	79,494	81,084	82,705	84,359	86,047
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(768,644)	3,187,085	7,442,148	7,804,324	8,175,433	8,555,662	8,945,200	9,344,239	9,752,975	10,171,610	10,600,346
Less:											
Interest - Operating Line of Credit	0	0	37,645	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	1,768,656	3,428,569	3,178,821	2,908,343	2,615,416	2,298,177	1,954,606	1,582,520	1,179,550	743,135
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	1,480,790	3,248,730	3,253,730	3,258,730	3,263,730	3,268,730	3,273,730	3,278,730	3,283,730	3,288,730
Pre-Tax Income	(768,644)	(62,362)	727,204	1,371,773	2,008,360	2,676,516	3,378,293	4,115,902	4,891,725	5,708,329	6,568,481
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(768,644)	(62,362)	727,204	1,371,773	2,008,360	2,676,516	3,378,293	4,115,902	4,891,725	5,708,329	6,568,481

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(768,644)	(62,362)	727,204	1,371,773	2,008,360	2,676,516	3,378,293	4,115,902	4,891,725	5,708,329	6,568,481
Non cash charges to operations											
Depreciation & Amortization	0	1,480,790	3,248,730	3,253,730	3,258,730	3,263,730	3,268,730	3,273,730	3,278,730	3,283,730	3,288,730
	(768,644)	1,418,429	3,975,934	4,625,503	5,267,090	5,940,246	6,647,023	7,389,632	8,170,455	8,992,059	9,857,212
Changes in non-cash working capital balances											
Accounts Receivable	0	1,087,058	20,675	21,532	21,957	22,390	22,831	23,281	23,741	24,209	24,686
Inventories	0	1,839,632	53,890	27,605	28,055	28,512	28,978	29,451	29,934	30,424	30,924
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(484,580)	(19,129)	(5,343)	(5,403)	(5,463)	(5,524)	(5,586)	(5,648)	(5,711)	(5,775)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	2,442,109	55,436	43,795	44,609	45,439	46,285	47,147	48,026	48,922	49,835
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	58,160,880	9,860,147	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	967,808	1,085,044	0	0	0	0	0	0	0	0	0
	59,353,689	10,945,191	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	30,644,732	13,571,668	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(1,979,250)	(3,173,311)	(3,436,694)	(3,721,938)	(4,030,857)	(4,365,417)	(4,727,744)	(5,120,144)	(5,545,114)	(6,005,356)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	29,477,600	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	(376,454)	647,187	1,045,014	1,400,543	1,763,950	2,135,322	2,514,741	2,902,285	3,298,023	3,702,021
Cash (Indebtedness), Beginning of Year	0	0	(376,454)	270,733	1,315,747	2,716,290	4,480,240	6,615,561	9,130,302	12,032,587	15,330,611
Cash (Bank Indebtedness), End of Year	0	(376,454)	270,733	1,315,747	2,716,290	4,480,240	6,615,561	9,130,302	12,032,587	15,330,611	19,032,632

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
1	5,047,931	508,581	12,375	5,568,886	(29,477,600)	0	(59,772)	(23,968,486)
2	4,822,931	66,417	12,375	4,901,722	0	0	(47,667)	(19,114,430)
3	4,822,931	66,417	12,375	4,901,722	0	0	(35,532)	(14,248,240)
4	4,822,931	66,417	12,375	4,901,722	0	0	(23,366)	(9,369,884)
5	4,822,931	66,417	12,375	4,901,722	0	0	(29,788)	(4,497,950)
6	4,822,931	66,417	12,375	4,901,722	0	0	2,692	406,464
7	4,947,931	66,417	12,375	5,026,722	0	0	36,221	5,469,408
8	4,867,573	66,417	12,375	4,946,365	0	0	69,438	10,485,211
9	4,867,573	70,817	12,375	4,950,765	0	0	102,907	15,538,883
10	4,867,573	70,817	12,375	4,950,765	0	0	136,598	20,626,246
11	4,742,573	70,817	12,375	4,825,765	0	0	169,680	25,621,691
12	4,930,073	70,817	12,375	5,013,265	0	0	204,233	30,839,189
13	5,180,073	19,250	202,875	5,402,198	0	0	241,609	36,482,996
14	4,680,073	19,250	202,875	4,902,198	0	0	275,901	41,661,096
15	0	19,250	564,303	583,553	0	0	281,631	42,526,280
16	0	6,600	352,544	359,144	0	0	285,903	43,171,327
17	0	6,600	0	6,600	0	0	287,853	43,465,780
18	0	6,600	0	6,600	0	0	289,816	43,762,196
19	0	6,600	0	6,600	0	0	289,816	44,058,612
20	0	6,600	0	6,600	0	0	289,816	44,355,027
21	0	6,600	0	6,600	0	0	289,816	44,651,443
22	0	6,600	0	6,600	0	0	289,816	44,947,859
23	0	6,600	0	6,600	0	0	289,816	45,244,275
24	0	6,600	0	6,600	0	0	289,816	45,540,691
Total	68,246,027	1,373,914	1,433,972	71,091,038	(29,477,600)	0	3,927,253	45,540,691

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improve-ments	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	142,857	0	3,710,643	355,687	286,137	327,606	5,047,931
2	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
3	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
4	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
5	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
6	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
7	0	0	142,857	125,000	3,710,643	355,687	286,137	327,606	4,947,931
8	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
9	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
10	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
11	0	0	62,500	0	3,710,643	355,687	286,137	327,606	4,742,573
12	0	250,000	0	0	3,710,643	355,687	286,137	327,606	4,930,073
13	0	500,000	0	0	3,710,643	355,687	286,137	327,606	5,180,073
14	0	0	0	0	3,710,643	355,687	286,137	327,606	4,680,073
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	750,000	1,250,000	500,000	51,949,000	4,979,617	4,005,921	4,586,489	68,246,027

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	1,250,000	1,875,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Gallons Sent to Inventory	0	0	342,857	342,857	0	0	0	0	0	0	0
Denaturant Added	0	0	62,500	93,750	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Net Gallons Sold (Denatured)	0	0	952,500	1,608,750	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000
Selling Price/Gallon (FOB Plant)	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389
State Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Federal Small Producer Payment	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035
Total Revenue - Fuel Ethanol	0	0	1,118,140	1,888,512	3,081,488	3,081,488	3,081,488	3,081,488	3,081,488	3,081,488	3,081,488
Lignin Residue											
Dry Tons Produced	0	0	13,994	20,991	27,987	27,987	27,987	27,987	27,987	27,987	27,987
Tons Sent to Inventory	0	0	4,798	4,798	0	0	0	0	0	0	0
Net Tons Sold	0	0	9,196	16,193	27,987	27,987	27,987	27,987	27,987	27,987	27,987
Selling Price/Dry Ton	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42
Total Revenue - Lignin Residue	0	0	59,040	103,961	179,686	179,686	179,686	179,686	179,686	179,686	179,686
CO_2											
Tons Produced	0	0	3,125	4,688	6,250	6,250	6,250	6,250	6,250	6,250	6,250
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	3,125	4,688	6,250	6,250	6,250	6,250	6,250	6,250	6,250
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	1,177,179	1,992,473	3,261,173	3,261,173	3,261,173	3,261,173	3,261,173	3,261,173	3,261,173

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	13,935	20,903	27,871	27,871	27,871	27,871	27,871	27,871	27,871
BDT Biomass to Inventory	0	0	9,556	9,556	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620
Biomass Expense	0	0	907,222	1,176,314	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366
Total Feedstock Expense	0	0	907,222	1,176,314	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366	1,076,366
Electricity (KWH)	0	0	1,775,000	2,662,500	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000
$/KWH	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400
Electricity Expense	0	0	71,000	106,500	142,000	142,000	142,000	142,000	142,000	142,000	142,000
Natural Gas (MMBTU)	0	0	51,144	76,716	102,288	102,288	102,288	102,288	102,288	102,288	102,288
$/MMBTU	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000
Natural Gas Expense	0	0	230,147	345,220	460,294	460,294	460,294	460,294	460,294	460,294	460,294
Makeup Water ('000 Gal.)	0	0	7,474	11,211	14,947	14,947	14,947	14,947	14,947	14,947	14,947
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	3,737	5,605	7,474	7,474	7,474	7,474	7,474	7,474	7,474
Effluent Disposal ('000 Gal)	0	0	4,777	7,166	9,554	9,554	9,554	9,554	9,554	9,554	9,554
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	4,777	7,166	9,554	9,554	9,554	9,554	9,554	9,554	9,554
Solid Waste Disposal (Tons)	0	0	1,206	1,809	2,412	2,412	2,412	2,412	2,412	2,412	2,412
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	12,059	18,088	24,117	24,117	24,117	24,117	24,117	24,117	24,117
Labor & Benefits	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875
Maintenance Materials & Services	0	0	43,291	64,936	86,582	86,582	86,582	86,582	86,582	86,582	86,582
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	43,750	65,625	87,500	87,500	87,500	87,500	87,500	87,500	87,500
Purchased Cellulase Enzymes	0	0	126,000	189,000	252,000	252,000	252,000	252,000	252,000	252,000	252,000
Other Chemicals	0	0	96,625	144,938	193,250	193,250	193,250	193,250	193,250	193,250	193,250
Office/Lab Supplies & Expenses	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Total Monthly Expense (non-feedstock)	202,875	202,875	834,260	1,168,703	1,484,395	1,484,395	1,484,395	1,484,395	1,484,395	1,484,395	1,484,395
Total Monthly Profit (Loss)	(202,875)	(202,875)	(564,303)	(352,544)	700,412	700,412	700,412	700,412	700,412	700,412	700,412

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	442,164	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	508,581
2	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
3	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
4	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
5	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
6	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
7	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
8	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
9	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
10	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
11	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
12	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	442,164	500,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,373,914

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(3)	(1)	(2)	(4)	(12)	(12)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
14	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
15	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
16	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
17	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
18	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
19	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
20	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
21	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
22	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
23	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
24	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000

Interim Period Labor Summary
Months 1-24

Position	Maintenance Manager	Boiler Operator	Maintenance Worker	Welder	Electrician	Instrument Technician	Monthly Total	Benefits at	Total
Number Employed	(1)	(1)	(4)	(1)	(1)	(2)	(49)	35.00%	
Annual Salary	50,000	40,000	33,000	35,000	35,000	37,000			
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
14	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
15	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
16	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
17	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
18	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
19	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
20	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
21	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
22	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
23	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
24	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	52,500,000
Anhydrous Ethanol Production (gal/yr)	50,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0590	$0.0602	$0.0614	$0.0626	$0.0639	$0.0651	$0.0664	$0.0678	$0.0691	$0.0705	2.00%
State Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Delivered Biomass Price ($/BDT)	$38.620	$39.006	$39.396	$39.790	$40.188	$40.590	$40.996	$41.406	$41.820	$42.238	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$6.420	$6.484	$6.549	$6.615	$6.681	$6.748	$6.815	$6.883	$6.952	$7.022	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0400	$0.0408	$0.0416	$0.0424	$0.0433	$0.0442	$0.0450	$0.0459	$0.0469	$0.0478	2.00%
Natural Gas Use (MMBTU/BDT)	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	
Natural Gas Price ($/MMBTU)	$4.5000	$4.5900	$4.6818	$4.7754	$4.8709	$4.9684	$5.0677	$5.1691	$5.2725	$5.3779	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	60	60	60	60	60	60	60	60	60	60	
Average Salary Including Benefits	$46,350	$47,509	$48,696	$49,914	$51,162	$52,441	$53,752	$55,096	$56,473	$57,885	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$73,281,000		
Engineering Expense	$7,022,687		
Construction Management	$5,632,300		
Contingency	$6,468,265		
Total	$92,404,000	$1.85	per gallon
Owner's Costs			
Inventory - Biomass	$615,000		
Inventory - Chemicals/Denaturant	$216,000		
Inventory - Ethanol & Lignin	$1,449,000		
Spare Parts	$600,000		
Startup Costs	$1,200,000		
Land	$225,000		
Administration Building & Furnishing	$300,000		
Rail Improvements	$750,000		
Site Development Costs	$1,200,000		
Tools and Laboratory Equipment	$250,000		
Organizational Costs	$600,000		
Capitalized Fees and Interest	$2,865,000		
Working Capital	$462,000		
Total Estimated Project Cost	$103,136,000		
Senior Debt			
Principal	$61,881,600	60.00%	
Interest Rate	8.0%	fixed	
Lender Fees	$618,816	1.000%	
Placement Fees	$0	0.000%	
Amortization Period	10	years	
Cash Sweep	0.000%		
Subordinated Debt			
Principal	$0	0.00%	
Interest Rate	0.00%		
Lender Fees	$0	0.000%	
Placement Fees	$0.00	0.000%	
Amortization Period	0	years	
Common Equity Investment			
Total Equity Amount	$41,254,400	40.00%	
Placement Fees	$0	0.000%	
Preferred Shares	$0	0.000%	
Common Shares	$41,254,400	100.000%	
Grants			
Amount	$0	0.00%	

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Tax Incentives ($/gal)

Year	Blenders Credit Federal	Blenders Credit State	State Producer Payment
1	$0.052	$0.000	$0.000
2	$0.052	$0.000	$0.000
3	$0.051	$0.000	$0.000
4	$0.051	$0.000	$0.000
5	$0.051	$0.000	$0.000
6	$0.051	$0.000	$0.000
7	$0.051	$0.000	$0.000
8	$0.051	$0.000	$0.000
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.000
Annual payment cap	$0
State incentive duration, years	0

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	83,323	3,154,554	6,904,903	11,276,380	16,282,965	21,938,821	28,258,294	35,255,905	42,946,343	51,344,456
Accounts Receivable - Trade	0	1,760,721	1,846,221	1,882,109	1,918,704	1,956,020	1,994,072	2,032,874	2,072,441	2,112,789	2,153,933
Inventories											
Feedstock	0	1,230,132	1,242,434	1,254,858	1,267,406	1,280,080	1,292,881	1,305,810	1,318,868	1,332,057	1,345,377
Purchased Cellulase Enzymes	0	216,000	218,160	220,342	222,545	224,770	227,018	229,288	231,581	233,897	236,236
Other Chemicals	0	165,643	167,299	168,972	170,662	172,369	174,092	175,833	177,592	179,367	181,161
Denaturant	0	50,000	51,000	52,020	53,060	54,122	55,204	56,308	57,434	58,583	59,755
Finished Product Inventory	0	1,404,278	1,476,977	1,505,687	1,534,963	1,564,816	1,595,257	1,626,299	1,657,953	1,690,232	1,723,147
Total Inventories	0	3,066,053	3,155,870	3,201,879	3,248,637	3,296,157	3,344,453	3,393,539	3,443,428	3,494,136	3,545,676
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	4,910,097	8,156,645	11,988,890	16,443,720	21,535,141	27,277,345	33,684,706	40,771,775	48,553,268	57,044,066
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	81,703,645	95,504,252	95,604,252	95,704,252	95,804,252	95,904,252	96,004,252	96,104,252	96,204,252	96,304,252	96,404,252
Less Accumulated Depreciation & Amortiz.	0	2,090,999	6,366,679	10,647,359	14,933,039	19,223,719	23,519,399	27,820,079	32,125,759	36,436,439	40,752,119
Net Property, Plant & Equipment	81,703,645	93,413,253	89,237,573	85,056,893	80,871,213	76,680,533	72,484,853	68,284,173	64,078,493	59,867,813	55,652,133
Capitalized Fees & Interest	1,350,469	2,865,889	2,579,300	2,292,711	2,006,122	1,719,533	1,432,945	1,146,356	859,767	573,178	286,589
Total Assets	83,279,113	101,414,239	100,198,518	99,563,494	99,546,056	100,160,208	101,420,143	103,340,235	105,935,034	109,219,259	113,207,787
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	807,634	839,516	848,421	857,426	866,530	875,737	885,046	894,460	903,979	913,605
Notes Payable	0	0	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	4,441,103	4,809,712	5,208,916	5,641,253	6,109,474	6,616,558	7,165,729	7,760,481	8,404,597	2,953,785
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	5,248,736	5,649,228	6,057,337	6,498,679	6,976,005	7,492,295	8,050,775	8,654,941	9,308,576	3,867,389
Long Term Debt (excluding current maturities	42,911,528	54,670,504	49,860,792	44,651,876	39,010,623	32,901,149	26,284,591	19,118,862	11,358,382	2,953,785	0
Subordinated Debt (excluding current maturiti	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities	42,911,528	59,919,240	55,510,020	50,709,213	45,509,302	39,877,154	33,776,886	27,169,637	20,013,322	12,262,361	3,867,389
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400	41,254,400
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(886,815)	240,599	3,434,098	7,599,881	12,782,354	19,028,654	26,388,857	34,916,197	44,667,312	55,702,498	68,085,998
Total Capital Shares & Equities	40,367,585	41,494,999	44,688,498	48,854,281	54,036,754	60,283,054	67,643,257	76,170,597	85,921,712	96,956,898	109,340,398
Total Liabilities & Equities	83,279,113	101,414,239	100,198,518	99,563,494	99,546,056	100,160,208	101,420,143	103,340,235	105,935,034	109,219,259	113,207,787

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	44,723,179	60,988,095	62,207,857	63,452,014	64,721,054	66,015,475	67,335,785	68,682,501	70,056,151	71,457,274
Lignin Residue	0	2,667,479	3,629,654	3,665,951	3,702,610	3,739,636	3,777,033	3,814,803	3,852,951	3,891,480	3,930,395
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Federal Small Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Total Sales	0	47,390,659	64,617,749	65,873,808	67,154,624	68,460,691	69,792,508	71,150,588	72,535,452	73,947,631	75,387,669
Production & Operating Expenses											
Feedstocks	0	17,824,103	21,742,586	21,960,012	22,179,612	22,401,409	22,625,423	22,851,677	23,080,194	23,310,996	23,544,105
Purchased Cellulase Enzymes	0	3,885,000	5,090,400	5,141,304	5,192,717	5,244,644	5,297,091	5,350,062	5,403,562	5,457,598	5,512,174
Other Chemicals	0	2,979,271	3,903,650	3,942,687	3,982,113	4,021,934	4,062,154	4,102,775	4,143,803	4,185,241	4,227,094
Utilities - Natural Gas	0	7,096,195	9,389,993	9,577,792	9,769,348	9,964,735	10,164,030	10,367,310	10,574,657	10,786,150	11,001,873
Electricity	0	2,189,167	2,896,800	2,954,736	3,013,831	3,074,107	3,135,589	3,198,301	3,262,267	3,327,513	3,394,063
Denaturants	0	1,348,958	1,785,000	1,820,700	1,857,114	1,894,256	1,932,141	1,970,784	2,010,200	2,050,404	2,091,412
Makeup Water	0	115,220	150,969	152,479	154,003	155,543	157,099	158,670	160,256	161,859	163,478
Wastewater Disposal	0	147,293	192,994	194,924	196,873	198,842	200,830	202,839	204,867	206,916	208,985
Solid Waste Disposal	0	371,804	487,163	492,035	496,955	501,925	506,944	512,014	517,134	522,305	527,528
Direct Labor & Benefits	0	1,561,950	1,600,999	1,641,024	1,682,049	1,724,101	1,767,203	1,811,383	1,856,668	1,903,084	1,950,662
Total Production Costs	0	37,518,961	47,240,554	47,877,692	48,524,617	49,181,497	49,848,504	50,525,815	51,213,608	51,912,065	52,621,373
Gross Profit	0	9,871,698	17,377,195	17,996,115	18,630,007	19,279,194	19,944,004	20,624,773	21,321,844	22,035,566	22,766,296
Administrative & Operating Expenses											
Maintenance Materials & Services	0	1,129,749	1,487,604	1,509,918	1,532,567	1,555,556	1,578,889	1,602,572	1,626,611	1,651,010	1,675,775
Enzymes & Chemicals	0	583,200	597,780	612,725	628,043	643,744	659,837	676,333	693,242	710,573	728,337
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	327,715	1,638,573	1,891,493	1,825,215	1,757,320	1,687,781	1,616,570	1,543,659	1,469,022	1,392,629	1,314,452
Admin. Salaries, Wages & Benefits	148,500	635,850	651,746	668,040	684,741	701,859	719,406	737,391	755,826	774,721	794,090
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	96,000	96,000	97,920	99,878	101,876	103,913	105,992	108,112	110,274	112,479	114,729
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(886,815)	5,693,676	12,554,109	13,181,865	13,825,017	14,483,889	15,158,809	15,850,114	16,558,147	17,283,256	18,025,798
Less:											
Interest - Operating Line of Credit	0	0	0	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	2,475,264	4,798,340	4,448,813	4,070,276	3,660,319	3,216,337	2,735,505	2,214,763	1,650,801	1,040,029
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	2,090,999	4,562,269	4,567,269	4,572,269	4,577,269	4,582,269	4,587,269	4,592,269	4,597,269	4,602,269
Pre-Tax Income	(886,815)	1,127,413	3,193,500	4,165,783	5,182,473	6,246,300	7,360,203	8,527,341	9,751,114	11,035,186	12,383,500
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(886,815)	1,127,413	3,193,500	4,165,783	5,182,473	6,246,300	7,360,203	8,527,341	9,751,114	11,035,186	12,383,500

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(886,815)	1,127,413	3,193,500	4,165,783	5,182,473	6,246,300	7,360,203	8,527,341	9,751,114	11,035,186	12,383,500
Non cash charges to operations											
Depreciation & Amortization	0	2,090,999	4,562,269	4,567,269	4,572,269	4,577,269	4,582,269	4,587,269	4,592,269	4,597,269	4,602,269
	(886,815)	3,218,412	7,755,769	8,733,052	9,754,741	10,823,569	11,942,472	13,114,609	14,343,383	15,632,455	16,985,769
Changes in non-cash working capital balances											
Accounts Receivable	0	1,760,721	85,500	35,887	36,595	37,316	38,052	38,802	39,568	40,348	41,144
Inventories	0	3,066,053	89,817	46,009	46,758	47,520	48,296	49,086	49,890	50,707	51,540
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(807,634)	(31,882)	(8,905)	(9,004)	(9,105)	(9,207)	(9,309)	(9,414)	(9,519)	(9,626)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	4,019,140	143,435	72,991	74,348	75,732	77,142	78,579	80,043	81,537	83,058
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	81,703,645	13,800,607	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	1,350,469	1,515,420	0	0	0	0	0	0	0	0	0
	83,279,113	15,316,028	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	42,911,528	18,970,072	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(2,769,994)	(4,441,103)	(4,809,712)	(5,208,916)	(5,641,253)	(6,109,474)	(6,616,558)	(7,165,729)	(7,760,481)	(8,404,597)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	41,254,400	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	83,323	3,071,231	3,750,349	4,371,478	5,006,584	5,655,856	6,319,473	6,997,611	7,690,438	8,398,113
Cash (Indebtedness), Beginning of Year	0	0	83,323	3,154,554	6,904,903	11,276,380	16,282,965	21,938,821	28,258,294	35,255,905	42,946,343
Cash (Bank Indebtedness), End of Year	0	83,323	3,154,554	6,904,903	11,276,380	16,282,965	21,938,821	28,258,294	35,255,905	42,946,343	51,344,456

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
1	6,996,732	693,566	12,375	7,702,673	(41,254,400)	0	(83,879)	(33,635,606)
2	6,771,732	74,750	12,375	6,858,857	0	0	(66,942)	(26,843,691)
3	6,771,732	74,750	12,375	6,858,857	0	0	(49,962)	(20,034,795)
4	6,771,732	74,750	12,375	6,858,857	0	0	(32,940)	(13,208,878)
5	6,771,732	74,750	12,375	6,858,857	0	0	(42,333)	(6,392,354)
6	6,771,732	74,750	12,375	6,858,857	0	0	3,110	469,613
7	6,959,232	74,750	12,375	7,046,357	0	0	50,106	7,566,077
8	6,862,804	74,750	12,375	6,949,929	0	0	96,773	14,612,779
9	6,862,804	79,150	12,375	6,954,329	0	0	143,781	21,710,888
10	6,862,804	79,150	12,375	6,954,329	0	0	191,101	28,856,319
11	6,675,304	79,150	12,375	6,766,829	0	0	237,488	35,860,635
12	6,850,304	79,150	12,375	6,941,829	0	0	285,350	43,087,813
13	7,200,304	19,250	239,750	7,459,304	0	0	336,981	50,884,098
14	6,600,304	19,250	239,750	6,859,304	0	0	384,956	58,128,358
15	0	19,250	886,609	905,859	0	0	393,561	59,427,778
16	0	6,600	553,916	560,516	0	0	399,922	60,388,216
17	0	6,600	0	6,600	0	0	402,632	60,797,448
18	0	6,600	0	6,600	0	0	405,360	61,209,409
19	0	6,600	0	6,600	0	0	405,360	61,621,369
20	0	6,600	0	6,600	0	0	405,360	62,033,329
21	0	6,600	0	6,600	0	0	405,360	62,445,290
22	0	6,600	0	6,600	0	0	405,360	62,857,250
23	0	6,600	0	6,600	0	0	405,360	63,269,210
24	0	6,600	0	6,600	0	0	405,360	63,681,171
Total	95,729,252	1,650,566	2,031,400	99,448,343	(41,254,400)	0	5,487,227	63,681,171

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improve-ments	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	171,429	0	5,234,357	501,621	402,307	462,019	6,996,732
2	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
3	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
4	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
5	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
6	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
7	0	0	171,429	187,500	5,234,357	501,621	402,307	462,019	6,959,232
8	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
9	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
10	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
11	0	0	75,000	0	5,234,357	501,621	402,307	462,019	6,675,304
12	0	250,000	0	0	5,234,357	501,621	402,307	462,019	6,850,304
13	0	600,000	0	0	5,234,357	501,621	402,307	462,019	7,200,304
14	0	0	0	0	5,234,357	501,621	402,307	462,019	6,600,304
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	850,000	1,500,000	750,000	73,281,000	7,022,687	5,632,300	6,468,265	95,729,252

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	2,083,333	3,125,000	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667
Gallons Sent to Inventory	0	0	571,429	571,429	0	0	0	0	0	0	0
Denaturant Added	0	0	104,167	156,250	208,333	208,333	208,333	208,333	208,333	208,333	208,333
Net Gallons Sold (Denatured)	0	0	1,587,500	2,681,250	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000
Selling Price/Gallon (FOB Plant)	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389
State Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Federal Small Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Revenue - Fuel Ethanol	0	0	1,808,004	3,053,676	4,982,688	4,982,688	4,982,688	4,982,688	4,982,688	4,982,688	4,982,688
Lignin Residue											
Dry Tons Produced	0	0	23,323	34,984	46,646	46,646	46,646	46,646	46,646	46,646	46,646
Tons Sent to Inventory	0	0	7,996	7,996	0	0	0	0	0	0	0
Net Tons Sold	0	0	15,326	26,988	46,646	46,646	46,646	46,646	46,646	46,646	46,646
Selling Price/Dry Ton	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42
Total Revenue - Lignin Residue	0	0	98,399	173,268	299,476	299,476	299,476	299,476	299,476	299,476	299,476
CO_2											
Tons Produced	0	0	5,208	7,813	10,417	10,417	10,417	10,417	10,417	10,417	10,417
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	5,208	7,813	10,417	10,417	10,417	10,417	10,417	10,417	10,417
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	1,906,403	3,226,944	5,282,164	5,282,164	5,282,164	5,282,164	5,282,164	5,282,164	5,282,164

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	23,226	34,838	46,451	46,451	46,451	46,451	46,451	46,451	46,451
BDT Biomass to Inventory	0	0	15,926	15,926	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620
Biomass Expense	0	0	1,512,037	1,960,523	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943
Total Feedstock Expense	0	0	1,512,037	1,960,523	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943	1,793,943
Electricity (KWH)	0	0	2,958,333	4,437,500	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667
$/KWH	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400
Electricity Expense	0	0	118,333	177,500	236,667	236,667	236,667	236,667	236,667	236,667	236,667
Natural Gas (MMBTU)	0	0	85,240	127,859	170,479	170,479	170,479	170,479	170,479	170,479	170,479
$/MMBTU	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000
Natural Gas Expense	0	0	383,578	575,367	767,156	767,156	767,156	767,156	767,156	767,156	767,156
Makeup Water ('000 Gal.)	0	0	12,456	18,684	24,912	24,912	24,912	24,912	24,912	24,912	24,912
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	6,228	9,342	12,456	12,456	12,456	12,456	12,456	12,456	12,456
Effluent Disposal ('000 Gal)	0	0	7,962	11,943	15,924	15,924	15,924	15,924	15,924	15,924	15,924
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	7,962	11,943	15,924	15,924	15,924	15,924	15,924	15,924	15,924
Solid Waste Disposal (Tons)	0	0	2,010	3,015	4,020	4,020	4,020	4,020	4,020	4,020	4,020
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	20,098	30,146	40,195	40,195	40,195	40,195	40,195	40,195	40,195
Labor & Benefits	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750
Maintenance Materials & Services	0	0	61,068	91,601	122,135	122,135	122,135	122,135	122,135	122,135	122,135
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	72,917	109,375	145,833	145,833	145,833	145,833	145,833	145,833	145,833
Purchased Cellulase Enzymes	0	0	210,000	315,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000
Other Chemicals	0	0	161,042	241,563	322,083	322,083	322,083	322,083	322,083	322,083	322,083
Office/Lab Supplies & Expenses	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Total Monthly Expense (non-feedstock)	239,750	239,750	1,280,975	1,820,337	2,340,949	2,340,949	2,340,949	2,340,949	2,340,949	2,340,949	2,340,949
Total Monthly Profit (Loss)	(239,750)	(239,750)	(886,609)	(553,916)	1,147,272	1,147,272	1,147,272	1,147,272	1,147,272	1,147,272	1,147,272

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	618,816	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	693,566
2	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
3	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
4	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
5	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
6	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
7	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
8	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
9	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
10	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
11	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
12	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	618,816	600,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,650,566

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(4)	(1)	(2)	(4)	(16)	(16)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
14	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
15	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
16	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
17	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
18	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
19	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
20	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
21	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
22	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
23	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
24	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333

Interim Period Labor Summary
Months 1-24

Position	Maintenance Manager	Boiler Operator	Maintenance Worker	Welder	Electrician	Instrument Technician	Monthly Total	Benefits at	Total
Number Employed	(1)	(1)	(6)	(1)	(1)	(2)	(60)	35.00%	
Annual Salary	50,000	40,000	33,000	35,000	35,000	37,000			
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
14	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
15	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
16	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
17	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
18	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
19	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
20	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
21	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
22	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
23	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
24	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	73,500,000
Anhydrous Ethanol Production (gal/yr)	70,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0590	$0.0602	$0.0614	$0.0626	$0.0639	$0.0651	$0.0664	$0.0678	$0.0691	$0.0705	2.00%
State Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Delivered Biomass Price ($/BDT)	$38.620	$39.006	$39.396	$39.790	$40.188	$40.590	$40.996	$41.406	$41.820	$42.238	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$6.420	$6.484	$6.549	$6.615	$6.681	$6.748	$6.815	$6.883	$6.952	$7.022	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0400	$0.0408	$0.0416	$0.0424	$0.0433	$0.0442	$0.0450	$0.0459	$0.0469	$0.0478	2.00%
Natural Gas Use (MMBTU/BDT)	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	3.6701	
Natural Gas Price ($/MMBTU)	$4.5000	$4.5900	$4.6818	$4.7754	$4.8709	$4.9684	$5.0677	$5.1691	$5.2725	$5.3779	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	71	71	71	71	71	71	71	71	71	71	
Average Salary Including Benefits	$45,063	$46,190	$47,345	$48,528	$49,742	$50,985	$52,260	$53,566	$54,905	$56,278	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$92,478,000		
Engineering Expense	$8,860,213		
Construction Management	$7,083,090		
Contingency	$8,160,723		
Total	$116,582,000	$1.67	per gallon
Owner's Costs			
Inventory - Biomass	$861,000		
Inventory - Chemicals/Denaturant	$302,000		
Inventory - Ethanol & Lignin	$2,028,000		
Spare Parts	$700,000		
Startup Costs	$1,400,000		
Land	$225,000		
Administration Building & Furnishing	$350,000		
Rail Improvements	$1,000,000		
Site Development Costs	$1,400,000		
Tools and Laboratory Equipment	$250,000		
Organizational Costs	$700,000		
Capitalized Fees and Interest	$3,591,000		
Working Capital	$490,000		
Total Estimated Project Cost	$129,879,000		
Senior Debt			
Principal	$77,927,400	60.00%	
Interest Rate	8.0%	fixed	
Lender Fees	$779,274	1.000%	
Placement Fees	$0	0.000%	
Amortization Period	10	years	
Cash Sweep	0.000%		
Subordinated Debt			
Principal	$0	0.00%	
Interest Rate	0.00%		
Lender Fees	$0	0.000%	
Placement Fees	$0.00	0.000%	
Amortization Period	0	years	
Common Equity Investment			
Total Equity Amount	$51,951,600	40.00%	
Placement Fees	$0	0.000%	
Preferred Shares	$0	0.000%	
Common Shares	$51,951,600	100.000%	
Grants			
Amount	$0	0.00%	

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Tax Incentives ($/gal)

Year	Blenders Credit Federal	Blenders Credit State	State Producer Payment
1	$0.052	$0.000	$0.000
2	$0.052	$0.000	$0.000
3	$0.051	$0.000	$0.000
4	$0.051	$0.000	$0.000
5	$0.051	$0.000	$0.000
6	$0.051	$0.000	$0.000
7	$0.051	$0.000	$0.000
8	$0.051	$0.000	$0.000
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.000
Annual payment cap	$0
State incentive duration, years	0

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	1,655,153	8,531,969	16,375,413	25,104,793	34,740,198	45,302,003	56,810,869	69,287,735	82,753,806	97,230,551
Accounts Receivable - Trade	0	2,465,010	2,584,710	2,634,952	2,686,185	2,738,428	2,791,700	2,846,024	2,901,418	2,957,905	3,015,507
Inventories											
Feedstock	0	1,722,185	1,739,407	1,756,801	1,774,369	1,792,113	1,810,034	1,828,134	1,846,415	1,864,880	1,883,528
Purchased Cellulase Enzymes	0	302,400	305,424	308,478	311,563	314,679	317,825	321,004	324,214	327,456	330,730
Other Chemicals	0	231,900	234,219	236,561	238,927	241,316	243,729	246,167	248,628	251,114	253,626
Denaturant	0	70,000	71,400	72,828	74,285	75,770	77,286	78,831	80,408	82,016	83,656
Finished Product Inventory	0	1,965,989	2,067,768	2,107,962	2,148,948	2,190,742	2,233,360	2,276,819	2,321,134	2,366,324	2,412,405
Total Inventories	0	4,292,474	4,418,218	4,482,630	4,548,091	4,614,620	4,682,234	4,750,955	4,820,800	4,891,790	4,963,946
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	8,412,637	15,534,897	23,492,995	32,339,070	42,093,245	52,775,938	64,407,847	77,009,953	90,603,502	105,210,004
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	102,927,451	120,282,026	120,382,026	120,482,026	120,582,026	120,682,026	120,782,026	120,882,026	120,982,026	121,082,026	121,182,026
Less Accumulated Depreciation & Amortiz.	0	2,640,810	8,027,000	13,418,190	18,814,380	24,215,570	29,621,760	35,032,950	40,449,140	45,870,330	51,296,520
Net Property, Plant & Equipment	102,927,451	117,641,217	112,355,027	107,063,837	101,767,647	96,466,457	91,160,267	85,849,077	80,532,887	75,211,697	69,885,507
Capitalized Fees & Interest	1,691,832	3,593,175	3,233,858	2,874,540	2,515,223	2,155,905	1,796,588	1,437,270	1,077,953	718,635	359,318
Total Assets	104,844,283	129,872,029	131,348,781	133,656,373	136,846,939	140,940,607	145,957,792	151,919,194	158,845,792	166,758,834	175,679,828
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	1,130,687	1,175,322	1,187,790	1,200,396	1,213,143	1,226,032	1,239,065	1,252,244	1,265,570	1,279,046
Notes Payable	0	0	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	5,592,673	6,056,863	6,559,579	7,104,021	7,693,651	8,332,221	9,023,791	9,772,761	10,583,895	3,719,697
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	6,723,361	7,232,185	7,747,369	8,304,417	8,906,794	9,558,252	10,262,856	11,025,005	11,849,466	4,998,743
Long Term Debt (excluding current maturities	53,888,393	68,846,478	62,789,616	56,230,036	49,126,015	41,432,364	33,100,144	24,076,353	14,303,592	3,719,697	0
Subordinated Debt (excluding current maturiti	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities	53,888,393	75,569,839	70,021,801	63,977,405	57,430,432	50,339,158	42,658,396	34,339,208	25,328,597	15,569,162	4,998,743
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600	51,951,600
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(995,710)	2,350,590	9,375,381	17,727,367	27,464,907	38,649,849	51,347,796	65,628,386	81,565,595	99,238,071	118,729,485
Total Capital Shares & Equities	50,955,890	54,302,190	61,326,981	69,678,967	79,416,507	90,601,449	103,299,396	117,579,986	133,517,195	151,189,671	170,681,085
Total Liabilities & Equities	104,844,283	129,872,029	131,348,781	133,656,373	136,846,939	140,940,607	145,957,792	151,919,194	158,845,792	166,758,834	175,679,828

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	62,612,451	85,383,333	87,091,000	88,832,820	90,609,476	92,421,666	94,270,099	96,155,501	98,078,611	100,040,183
Lignin Residue	0	3,734,471	5,081,516	5,132,331	5,183,654	5,235,491	5,287,846	5,340,724	5,394,131	5,448,073	5,502,553
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Federal Small Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Total Sales	0	66,346,922	90,464,849	92,223,331	94,016,474	95,844,967	97,709,511	99,610,823	101,549,632	103,526,684	105,542,737
Production & Operating Expenses											
Feedstocks	0	24,953,744	30,439,621	30,744,017	31,051,457	31,361,972	31,675,592	31,992,348	32,312,271	32,635,394	32,961,748
Purchased Cellulase Enzymes	0	5,439,000	7,126,560	7,197,826	7,269,804	7,342,502	7,415,927	7,490,086	7,564,987	7,640,637	7,717,043
Other Chemicals	0	4,170,979	5,465,110	5,519,761	5,574,959	5,630,708	5,687,015	5,743,886	5,801,324	5,859,338	5,917,931
Utilities - Natural Gas	0	9,934,673	13,145,990	13,408,909	13,677,087	13,950,629	14,229,642	14,514,235	14,804,519	15,100,610	15,402,622
Electricity	0	3,064,833	4,055,520	4,136,630	4,219,363	4,303,750	4,389,825	4,477,622	4,567,174	4,658,518	4,751,688
Denaturants	0	1,888,542	2,499,000	2,548,980	2,599,960	2,651,959	2,704,998	2,759,098	2,814,280	2,870,565	2,927,977
Makeup Water	0	161,307	211,356	213,470	215,605	217,761	219,938	222,138	224,359	226,603	228,869
Wastewater Disposal	0	206,210	270,191	272,893	275,622	278,379	281,162	283,974	286,814	289,682	292,579
Solid Waste Disposal	0	520,525	682,029	688,849	695,738	702,695	709,722	716,819	723,987	731,227	738,539
Direct Labor & Benefits	0	1,858,950	1,905,424	1,953,059	2,001,886	2,051,933	2,103,231	2,155,812	2,209,707	2,264,950	2,321,574
Total Production Costs	0	52,198,765	65,800,801	66,684,395	67,581,480	68,492,288	69,417,053	70,356,016	71,309,423	72,277,523	73,260,569
Gross Profit	0	14,148,157	24,664,048	25,538,935	26,434,994	27,352,679	28,292,458	29,254,807	30,240,209	31,249,161	32,282,167
Administrative & Operating Expenses											
Maintenance Materials & Services	0	1,425,703	1,877,303	1,905,463	1,934,045	1,963,056	1,992,501	2,022,389	2,052,725	2,083,516	2,114,768
Maintenance - Wages & Benefits	0	672,300	689,108	706,335	723,994	742,093	760,646	779,662	799,153	819,132	839,611
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	412,610	2,063,049	2,380,898	2,296,858	2,210,796	2,122,679	2,032,474	1,940,146	1,845,661	1,748,984	1,650,080
Admin. Salaries, Wages & Benefits	148,500	668,250	684,956	702,080	719,632	737,623	756,064	774,965	794,339	814,198	834,553
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	120,000	120,000	122,400	124,848	127,345	129,892	132,490	135,139	137,842	140,599	143,411
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(995,710)	9,104,206	18,812,840	19,704,877	20,618,739	21,554,884	22,513,783	23,495,914	24,501,765	25,531,834	26,586,629
Less:											
Interest - Operating Line of Credit	0	0	0	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	3,117,096	6,042,542	5,602,383	5,125,692	4,609,434	4,050,328	3,444,817	2,789,048	2,078,851	1,309,707
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	2,640,810	5,745,508	5,750,508	5,755,508	5,760,508	5,765,508	5,770,508	5,775,508	5,780,508	5,785,508
Pre-Tax Income	(995,710)	3,346,300	7,024,790	8,351,987	9,737,540	11,184,942	12,697,947	14,280,590	15,937,209	17,672,476	19,491,414
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(995,710)	3,346,300	7,024,790	8,351,987	9,737,540	11,184,942	12,697,947	14,280,590	15,937,209	17,672,476	19,491,414

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(995,710)	3,346,300	7,024,790	8,351,987	9,737,540	11,184,942	12,697,947	14,280,590	15,937,209	17,672,476	19,491,414
Non cash charges to operations											
Depreciation & Amortization	0	2,640,810	5,745,508	5,750,508	5,755,508	5,760,508	5,765,508	5,770,508	5,775,508	5,780,508	5,785,508
	(995,710)	5,987,110	12,770,298	14,102,494	15,493,047	16,945,450	18,463,455	20,051,097	21,712,717	23,452,983	25,276,922
Changes in non-cash working capital balances											
Accounts Receivable	0	2,465,010	119,700	50,242	51,233	52,243	53,273	54,323	55,395	56,487	57,602
Inventories	0	4,292,474	125,744	64,412	65,461	66,528	67,615	68,720	69,845	70,990	72,156
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(1,130,687)	(44,635)	(12,467)	(12,606)	(12,747)	(12,889)	(13,033)	(13,179)	(13,327)	(13,476)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	5,626,796	200,809	102,187	104,088	106,024	107,998	110,010	112,061	114,151	116,282
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	102,927,451	17,354,575	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	1,691,832	1,901,343	0	0	0	0	0	0	0	0	0
	104,844,283	19,255,919	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	53,888,393	24,039,007	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(3,488,248)	(5,592,673)	(6,056,863)	(6,559,579)	(7,104,021)	(7,693,651)	(8,332,221)	(9,023,791)	(9,772,761)	(10,583,895)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	51,951,600	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	1,655,153	6,876,816	7,843,444	8,729,380	9,635,404	10,561,805	11,508,866	12,476,865	13,466,071	14,476,745
Cash (Indebtedness), Beginning of Year	0	0	1,655,153	8,531,969	16,375,413	25,104,793	34,740,198	45,302,003	56,810,869	69,287,735	82,753,806
Cash (Bank Indebtedness), End of Year	0	1,655,153	8,531,969	16,375,413	25,104,793	34,740,198	45,302,003	56,810,869	69,287,735	82,753,806	97,230,551

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
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1	8,752,288	862,357	12,375	9,627,020	(51,951,600)	0	(105,811)	(42,430,392)
2	8,527,288	83,083	12,375	8,622,746	0	0	(84,519)	(33,892,165)
3	8,527,288	83,083	12,375	8,622,746	0	0	(63,174)	(25,332,592)
4	8,527,288	83,083	12,375	8,622,746	0	0	(41,775)	(16,751,621)
5	8,527,288	83,083	12,375	8,622,746	0	0	(54,193)	(8,183,068)
6	8,527,288	83,083	12,375	8,622,746	0	0	2,931	442,610
7	8,777,288	83,083	12,375	8,872,746	0	0	62,102	9,377,458
8	8,664,788	83,083	12,375	8,760,246	0	0	120,918	18,258,622
9	8,664,788	87,483	12,375	8,764,646	0	0	180,155	27,203,423
10	8,664,788	87,483	12,375	8,764,646	0	0	239,787	36,207,856
11	8,414,788	87,483	12,375	8,514,646	0	0	298,150	45,020,652
12	8,577,288	87,483	12,375	8,677,146	0	0	357,985	54,055,783
13	9,027,288	19,250	276,625	9,323,163	0	0	422,526	63,801,472
14	8,327,288	19,250	276,625	8,623,163	0	0	482,831	72,907,465
15	0	19,250	1,173,798	1,193,048	0	0	494,003	74,594,517
16	0	6,600	696,313	702,913	0	0	501,983	75,799,413
17	0	6,600	0	6,600	0	0	505,373	76,311,387
18	0	6,600	0	6,600	0	0	508,787	76,826,773
19	0	6,600	0	6,600	0	0	508,787	77,342,160
20	0	6,600	0	6,600	0	0	508,787	77,857,546
21	0	6,600	0	6,600	0	0	508,787	78,372,933
22	0	6,600	0	6,600	0	0	508,787	78,888,319
23	0	6,600	0	6,600	0	0	508,787	79,403,706
24	0	6,600	0	6,600	0	0	508,787	79,919,093
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Total	120,507,026	1,911,024	2,534,736	124,989,912	(51,951,600)	0	6,880,781	79,919,093

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improve-ments	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	200,000	0	6,605,571	632,872	505,935	582,909	8,752,288
2	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
3	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
4	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
5	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
6	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
7	0	0	200,000	250,000	6,605,571	632,872	505,935	582,909	8,777,288
8	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
9	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
10	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
11	0	0	87,500	0	6,605,571	632,872	505,935	582,909	8,414,788
12	0	250,000	0	0	6,605,571	632,872	505,935	582,909	8,577,288
13	0	700,000	0	0	6,605,571	632,872	505,935	582,909	9,027,288
14	0	0	0	0	6,605,571	632,872	505,935	582,909	8,327,288
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	950,000	1,750,000	1,000,000	92,478,000	8,860,213	7,083,090	8,160,723	120,507,026

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	2,916,667	4,375,000	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333
Gallons Sent to Inventory	0	0	800,000	800,000	0	0	0	0	0	0	0
Denaturant Added	0	0	145,833	218,750	291,667	291,667	291,667	291,667	291,667	291,667	291,667
Net Gallons Sold (Denatured)	0	0	2,222,500	3,753,750	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000
Selling Price/Gallon (FOB Plant)	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389	$1.1389
State Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Federal Small Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Revenue - Fuel Ethanol	0	0	2,531,205	4,275,146	6,975,763	6,975,763	6,975,763	6,975,763	6,975,763	6,975,763	6,975,763
Lignin Residue											
Dry Tons Produced	0	0	32,652	48,978	65,304	65,304	65,304	65,304	65,304	65,304	65,304
Tons Sent to Inventory	0	0	11,195	11,195	0	0	0	0	0	0	0
Net Tons Sold	0	0	21,457	37,783	65,304	65,304	65,304	65,304	65,304	65,304	65,304
Selling Price/Dry Ton	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42
Total Revenue - Lignin Residue	0	0	137,759	242,576	419,267	419,267	419,267	419,267	419,267	419,267	419,267
CO_2											
Tons Produced	0	0	7,292	10,938	14,583	14,583	14,583	14,583	14,583	14,583	14,583
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	7,292	10,938	14,583	14,583	14,583	14,583	14,583	14,583	14,583
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	2,668,964	4,517,722	7,395,029	7,395,029	7,395,029	7,395,029	7,395,029	7,395,029	7,395,029

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	32,516	48,774	65,032	65,032	65,032	65,032	65,032	65,032	65,032
BDT Biomass to Inventory	0	0	22,297	22,297	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620	$38.620
Biomass Expense	0	0	2,116,852	2,744,732	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520
Total Feedstock Expense	0	0	2,116,852	2,744,732	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520	2,511,520
Electricity (KWH)	0	0	4,141,667	6,212,500	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333
$/KWH	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400	$0.0400
Electricity Expense	0	0	165,667	248,500	331,333	331,333	331,333	331,333	331,333	331,333	331,333
Natural Gas (MMBTU)	0	0	119,335	179,003	238,671	238,671	238,671	238,671	238,671	238,671	238,671
$/MMBTU	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000	$4.5000
Natural Gas Expense	0	0	537,009	805,514	1,074,019	1,074,019	1,074,019	1,074,019	1,074,019	1,074,019	1,074,019
Makeup Water ('000 Gal.)	0	0	17,439	26,158	34,877	34,877	34,877	34,877	34,877	34,877	34,877
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	8,719	13,079	17,439	17,439	17,439	17,439	17,439	17,439	17,439
Effluent Disposal ('000 Gal)	0	0	11,147	16,720	22,293	22,293	22,293	22,293	22,293	22,293	22,293
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	11,147	16,720	22,293	22,293	22,293	22,293	22,293	22,293	22,293
Solid Waste Disposal (Tons)	0	0	2,814	4,220	5,627	5,627	5,627	5,627	5,627	5,627	5,627
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	28,137	42,205	56,273	56,273	56,273	56,273	56,273	56,273	56,273
Labor & Benefits	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625
Maintenance Materials & Services	0	0	77,065	115,598	154,130	154,130	154,130	154,130	154,130	154,130	154,130
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	102,083	153,125	204,167	204,167	204,167	204,167	204,167	204,167	204,167
Purchased Cellulase Enzymes	0	0	294,000	441,000	588,000	588,000	588,000	588,000	588,000	588,000	588,000
Other Chemicals	0	0	225,458	338,188	450,917	450,917	450,917	450,917	450,917	450,917	450,917
Office/Lab Supplies & Expenses	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Total Monthly Expense (non-feedstock)	276,625	276,625	1,725,910	2,469,303	3,193,945	3,193,945	3,193,945	3,193,945	3,193,945	3,193,945	3,193,945
Total Monthly Profit (Loss)	(276,625)	(276,625)	(1,173,798)	(696,313)	1,689,565	1,689,565	1,689,565	1,689,565	1,689,565	1,689,565	1,689,565

NREL Bioethanol Co-Location Study -- Wheatfield, IN Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	779,274	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	862,357
2	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
3	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
4	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
5	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
6	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
7	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
8	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
9	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
10	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
11	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
12	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	779,274	700,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,911,024

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(5)	(1)	(2)	(4)	(20)	(20)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
14	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
15	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
16	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
17	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
18	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
19	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
20	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
21	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
22	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
23	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
24	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667

Interim Period Labor Summary
Months 1-24

Position Number Employed Annual Salary	Maintenance Manager (1) 50,000	Boiler Operator (1) 40,000	Maintenance Worker (8) 33,000	Welder (1) 35,000	Electrician (1) 35,000	Instrument Technician (2) 37,000	Monthly Total (71)	Benefits at 35.00%	Total
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
14	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
15	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
16	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
17	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
18	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
19	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
20	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
21	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
22	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
23	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
24	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	31,500,000
Anhydrous Ethanol Production (gal/yr)	30,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0690	$0.0704	$0.0718	$0.0732	$0.0747	$0.0762	$0.0777	$0.0793	$0.0808	$0.0825	2.00%
State Producer Payment ($/gal)	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	
Delivered Biomass Price ($/BDT)	$33.860	$34.199	$34.541	$34.886	$35.235	$35.587	$35.943	$36.303	$36.666	$37.032	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	334,448	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$3.181	$3.213	$3.245	$3.278	$3.310	$3.343	$3.377	$3.411	$3.445	$3.479	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0300	$0.0306	$0.0312	$0.0318	$0.0325	$0.0331	$0.0338	$0.0345	$0.0351	$0.0359	2.00%
Natural Gas Use (MMBTU/BDT)	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	
Natural Gas Price ($/MMBTU)	$3.0000	$3.0600	$3.1212	$3.1836	$3.2473	$3.3122	$3.3785	$3.4461	$3.5150	$3.5853	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	49	49	49	49	49	49	49	49	49	49	
Average Salary Including Benefits	$48,214	$49,420	$50,655	$51,922	$53,220	$54,550	$55,914	$57,312	$58,744	$60,213	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$51,949,000		
Engineering Expense	$4,979,617		
Construction Management	$4,005,921		
Contingency	$4,586,489		
Total	$65,521,000	$2.18	per gallon

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Owner's Costs	
Inventory - Biomass	$324,000
Inventory - Chemicals/Denaturant	$129,000
Inventory - Ethanol & Lignin	$837,000
Spare Parts	$500,000
Startup Costs	$1,000,000
Land	$225,000
Administration Building & Furnishing	$250,000
Rail Improvements	$500,000
Site Development Costs	$1,000,000
Tools and Laboratory Equipment	$250,000
Organizational Costs	$500,000
Capitalized Fees and Interest	$2,057,000
Working Capital	$524,000
Total Estimated Project Cost	$73,617,000

Senior Debt		
Principal	$44,170,200	60.00%
Interest Rate	8.0%	fixed
Lender Fees	$441,702	1.000%
Placement Fees	$0	0.000%
Amortization Period	10	years
Cash Sweep	0.000%	

Subordinated Debt		
Principal	$0	0.00%
Interest Rate	0.00%	
Lender Fees	$0	0.000%
Placement Fees	$0.00	0.000%
Amortization Period	0	years

Common Equity Investment		
Total Equity Amount	$29,446,800	40.00%
Placement Fees	$0	0.000%
Preferred Shares	$0	0.000%
Common Shares	$29,446,800	100.000%

Grants		
Amount	$0	0.00%

Tax Incentives ($/gal)

Year	Blenders Credit Federal	Blenders Credit State	State Producer Payment
1	$0.052	$0.000	$0.094
2	$0.052	$0.000	$0.094
3	$0.051	$0.000	$0.094
4	$0.051	$0.000	$0.094
5	$0.051	$0.000	$0.094
6	$0.051	$0.000	$0.094
7	$0.051	$0.000	$0.094
8	$0.051	$0.000	$0.094
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.180
Annual payment cap	$2,812,500
State incentive duration, years	8

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	4,111,062	10,568,644	17,362,858	24,566,060	32,187,145	40,235,117	48,719,083	57,648,247	64,219,404	71,254,435
Accounts Receivable - Trade	0	1,130,122	1,067,161	1,088,196	1,109,649	1,131,527	1,153,840	1,176,596	1,199,804	1,223,473	1,247,612
Inventories											
Feedstock	0	647,109	653,581	660,116	666,717	673,385	680,118	686,920	693,789	700,727	707,734
Purchased Enzymes	0	129,600	130,896	132,205	133,527	134,862	136,211	137,573	138,949	140,338	141,742
Other Chemicals	0	99,386	100,380	101,383	102,397	103,421	104,455	105,500	106,555	107,620	108,697
Denaturant	0	30,000	30,600	31,212	31,836	32,473	33,122	33,785	34,461	35,150	35,853
Finished Product Inventory	0	804,629	853,729	870,557	887,719	905,222	923,072	941,277	959,843	978,778	998,089
Total Inventories	0	1,710,724	1,769,185	1,795,474	1,822,197	1,849,363	1,876,979	1,905,054	1,933,596	1,962,613	1,992,114
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	6,951,907	13,404,990	20,246,528	27,497,905	35,168,035	43,265,937	51,800,734	60,781,647	67,405,490	74,494,161
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	58,160,880	68,021,027	68,121,027	68,221,027	68,321,027	68,421,027	68,521,027	68,621,027	68,721,027	68,821,027	68,921,027
Less Accumulated Depreciation & Amortiz.	0	1,480,790	4,524,235	7,572,680	10,626,125	13,684,570	16,748,015	19,816,460	22,889,905	25,968,350	29,051,795
Net Property, Plant & Equipment	58,160,880	66,540,237	63,596,792	60,648,347	57,694,902	54,736,457	51,773,012	48,804,567	45,831,122	42,852,677	39,869,232
Capitalized Fees & Interest	969,324	2,049,255	1,844,329	1,639,404	1,434,478	1,229,553	1,024,627	819,702	614,776	409,851	204,925
Total Assets	59,355,204	75,766,399	79,071,111	82,759,279	86,852,286	91,359,045	96,288,576	101,650,002	107,452,545	110,893,018	114,793,318
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	440,359	457,770	462,654	467,592	472,586	477,637	482,745	487,910	493,134	498,416
Notes Payable	0	0	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	3,169,995	3,433,104	3,718,049	4,026,646	4,360,855	4,722,804	5,114,795	5,539,320	5,999,081	2,108,369
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	3,610,354	3,890,873	4,180,703	4,494,238	4,833,442	5,200,441	5,597,539	6,027,230	6,492,214	2,606,786
Long Term Debt (excluding current maturities	30,677,048	39,023,023	35,589,919	31,871,870	27,845,224	23,484,369	18,761,565	13,646,770	8,107,450	2,108,369	0
Subordinated Debt (excluding current maturit	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0		0	0	0
Total Liabilities	30,677,048	42,633,377	39,480,793	36,052,573	32,339,462	28,317,811	23,962,006	19,244,309	14,134,680	8,600,584	2,606,786
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800	29,446,800
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(768,644)	3,686,222	10,143,519	17,259,906	25,066,024	33,594,434	42,879,770	52,958,893	63,871,065	72,845,634	82,739,732
Total Capital Shares & Equities	28,678,156	33,133,022	39,590,319	46,706,706	54,512,824	63,041,234	72,326,570	82,405,693	93,317,865	102,292,434	112,186,532
Total Liabilities & Equities	59,355,204	75,766,399	79,071,111	82,759,279	86,852,286	91,359,045	96,288,576	101,650,002	107,452,545	110,893,018	114,793,318

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	26,598,295	36,271,557	36,996,988	37,736,928	38,491,666	39,261,500	40,046,730	40,847,664	41,664,618	42,497,910
Lignin Residue	0	793,034	1,079,086	1,089,877	1,100,776	1,111,784	1,122,902	1,134,131	1,145,472	1,156,927	1,168,496
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	2,208,867	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	0	0
Federal Small Producer Payment	0	824,644	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000	1,050,000
Total Sales	0	30,424,840	41,213,143	41,949,365	42,700,204	43,465,950	44,246,901	45,043,360	45,855,636	43,871,544	44,716,406
Production & Operating Expenses											
Feedstocks	0	9,376,346	11,437,659	11,552,035	11,667,556	11,784,231	11,902,074	12,021,094	12,141,305	12,262,718	12,385,346
Purchased Cellulase Enzymes	0	2,331,000	3,054,240	3,084,782	3,115,630	3,146,787	3,178,254	3,210,037	3,242,137	3,274,559	3,307,304
Other Chemicals	0	1,787,563	2,342,190	2,365,612	2,389,268	2,413,161	2,437,292	2,461,665	2,486,282	2,511,145	2,536,256
Utilities - Natural Gas	0	2,554,630	3,380,397	3,448,005	3,516,965	3,587,305	3,659,051	3,732,232	3,806,876	3,883,014	3,960,674
Electricity	0	985,125	1,303,560	1,329,631	1,356,224	1,383,348	1,411,015	1,439,236	1,468,020	1,497,381	1,527,328
Denaturants	0	809,375	1,071,000	1,092,420	1,114,268	1,136,554	1,159,285	1,182,471	1,206,120	1,230,242	1,254,847
Makeup Water	0	69,132	90,581	91,487	92,402	93,326	94,259	95,202	96,154	97,115	98,087
Wastewater Disposal	0	88,376	115,796	116,954	118,124	119,305	120,498	121,703	122,920	124,149	125,391
Solid Waste Disposal	0	223,082	292,298	295,221	298,173	301,155	304,167	307,208	310,280	313,383	316,517
Direct Labor & Benefits	0	1,264,950	1,296,574	1,328,988	1,362,213	1,396,268	1,431,175	1,466,954	1,503,628	1,541,219	1,579,749
Total Production Costs	0	19,489,579	24,384,296	24,705,137	25,030,823	25,361,439	25,697,070	26,037,802	26,383,724	26,734,925	27,091,499
Gross Profit	0	10,935,262	16,828,848	17,244,229	17,669,380	18,104,511	18,549,831	19,005,559	19,471,913	17,136,619	17,624,907
Administrative & Operating Expenses											
Maintenance Materials & Services	0	800,880	1,054,565	1,070,383	1,086,439	1,102,736	1,119,277	1,136,066	1,153,107	1,170,403	1,187,959
Maintenance - Wages & Benefits	0	494,100	506,453	519,114	532,092	545,394	559,029	573,005	587,330	602,013	617,063
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	233,544	1,167,718	1,348,658	1,302,092	1,254,357	1,205,434	1,155,301	1,103,939	1,051,327	997,444	942,268
Admin. Salaries, Wages & Benefits	148,500	603,450	618,536	634,000	649,850	666,096	682,748	699,817	717,312	735,245	753,626
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	72,000	72,000	73,440	74,909	76,407	77,935	79,494	81,084	82,705	84,359	86,047
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(768,644)	7,702,464	13,130,654	13,545,257	13,969,792	14,404,464	14,849,482	15,305,058	15,771,409	13,436,257	13,924,827
Less:											
Interest - Operating Line of Credit	0	0	0	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	1,766,808	3,424,987	3,175,499	2,905,304	2,612,684	2,295,775	1,952,564	1,580,866	1,178,318	742,358
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	1,480,790	3,248,370	3,253,370	3,258,370	3,263,370	3,268,370	3,273,370	3,278,370	3,283,370	3,288,370
Pre-Tax Income	(768,644)	4,454,866	6,457,296	7,116,388	7,806,118	8,528,410	9,285,336	10,079,123	10,912,172	8,974,569	9,894,099
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(768,644)	4,454,866	6,457,296	7,116,388	7,806,118	8,528,410	9,285,336	10,079,123	10,912,172	8,974,569	9,894,099

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(768,644)	4,454,866	6,457,296	7,116,388	7,806,118	8,528,410	9,285,336	10,079,123	10,912,172	8,974,569	9,894,099
Non cash charges to operations											
Depreciation & Amortization	0	1,480,790	3,248,370	3,253,370	3,258,370	3,263,370	3,268,370	3,273,370	3,278,370	3,283,370	3,288,370
	(768,644)	5,935,656	9,705,667	10,369,758	11,064,488	11,791,781	12,553,706	13,352,494	14,190,543	12,257,939	13,182,469
Changes in non-cash working capital balances											
Accounts Receivable	0	1,130,122	(62,960)	21,035	21,453	21,878	22,313	22,756	23,208	23,669	24,139
Inventories	0	1,710,724	58,461	26,288	26,723	27,166	27,616	28,075	28,542	29,017	29,501
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(440,359)	(17,411)	(4,884)	(4,939)	(4,994)	(5,051)	(5,108)	(5,165)	(5,224)	(5,283)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	2,400,487	(21,910)	42,440	43,237	44,050	44,879	45,723	46,585	47,462	48,357
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	58,160,880	9,860,147	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	969,324	1,079,931	0	0	0	0	0	0	0	0	0
	59,355,204	10,940,078	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	30,677,048	13,493,152	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(1,977,182)	(3,169,995)	(3,433,104)	(3,718,049)	(4,026,646)	(4,360,855)	(4,722,804)	(5,114,795)	(5,539,320)	(5,999,081)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	29,446,800	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	4,111,062	6,457,582	6,794,215	7,203,201	7,621,085	8,047,972	8,483,966	8,929,164	6,571,157	7,035,031
Cash (Indebtedness), Beginning of Year	0	0	4,111,062	10,568,644	17,362,858	24,566,060	32,187,145	40,235,117	48,719,083	57,648,247	64,219,404
Cash (Bank Indebtedness), End of Year	0	4,111,062	10,568,644	17,362,858	24,566,060	32,187,145	40,235,117	48,719,083	57,648,247	64,219,404	71,254,435

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
1	5,047,931	508,119	12,375	5,568,424	(29,446,800)	0	(59,696)	(23,938,072)
2	4,822,931	66,417	12,375	4,901,722	0	0	(47,591)	(19,083,940)
3	4,822,931	66,417	12,375	4,901,722	0	0	(35,456)	(14,217,674)
4	4,822,931	66,417	12,375	4,901,722	0	0	(23,290)	(9,339,242)
5	4,822,931	66,417	12,375	4,901,722	0	0	(29,583)	(4,467,103)
6	4,822,931	66,417	12,375	4,901,722	0	0	2,897	437,517
7	4,947,931	66,417	12,375	5,026,722	0	0	36,428	5,500,667
8	4,867,573	66,417	12,375	4,946,365	0	0	69,647	10,516,679
9	4,867,573	70,817	12,375	4,950,765	0	0	103,116	15,570,561
10	4,867,573	70,817	12,375	4,950,765	0	0	136,809	20,658,134
11	4,742,573	70,817	12,375	4,825,765	0	0	169,893	25,653,792
12	4,930,073	70,817	12,375	5,013,265	0	0	204,447	30,871,504
13	5,180,073	19,250	202,875	5,402,198	0	0	241,825	36,515,527
14	4,680,073	19,250	202,875	4,902,198	0	0	276,118	41,693,844
15	0	19,250	292,691	311,941	0	0	280,039	42,285,824
16	0	6,600	0	6,600	0	0	281,949	42,574,373
17	0	6,600	0	6,600	0	0	283,873	42,864,846
18	0	6,600	0	6,600	0	0	285,810	43,157,256
19	0	6,600	0	6,600	0	0	285,810	43,449,666
20	0	6,600	0	6,600	0	0	285,810	43,742,075
21	0	6,600	0	6,600	0	0	285,810	44,034,485
22	0	6,600	0	6,600	0	0	285,810	44,326,894
23	0	6,600	0	6,600	0	0	285,810	44,619,304
24	0	6,600	0	6,600	0	0	285,810	44,911,714
Total	68,246,027	1,373,452	809,816	70,466,420	(29,446,800)	0	3,892,093	44,911,714

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improvements	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	142,857	0	3,710,643	355,687	286,137	327,606	5,047,931
2	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
3	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
4	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
5	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
6	0	0	142,857	0	3,710,643	355,687	286,137	327,606	4,822,931
7	0	0	142,857	125,000	3,710,643	355,687	286,137	327,606	4,947,931
8	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
9	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
10	0	0	62,500	125,000	3,710,643	355,687	286,137	327,606	4,867,573
11	0	0	62,500	0	3,710,643	355,687	286,137	327,606	4,742,573
12	0	250,000	0	0	3,710,643	355,687	286,137	327,606	4,930,073
13	0	500,000	0	0	3,710,643	355,687	286,137	327,606	5,180,073
14	0	0	0	0	3,710,643	355,687	286,137	327,606	4,680,073
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	750,000	1,250,000	500,000	51,949,000	4,979,617	4,005,921	4,586,489	68,246,027

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	1,250,000	1,875,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Gallons Sent to Inventory	0	0	342,857	342,857	0	0	0	0	0	0	0
Denaturant Added	0	0	62,500	93,750	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Net Gallons Sold (Denatured)	0	0	952,500	1,608,750	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000	2,625,000
Selling Price/Gallon (FOB Plant)	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289
State Producer Payment	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094	$0.094
Federal Small Producer Payment	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035	$0.035
Total Revenue - Fuel Ethanol	0	0	1,197,912	2,023,244	3,301,331	3,301,331	3,301,331	3,301,331	3,301,331	3,301,331	3,301,331
Lignin Residue											
Dry Tons Produced	0	0	13,994	20,991	27,987	27,987	27,987	27,987	27,987	27,987	27,987
Tons Sent to Inventory	0	0	4,798	4,798	0	0	0	0	0	0	0
Net Tons Sold	0	0	9,196	16,193	27,987	27,987	27,987	27,987	27,987	27,987	27,987
Selling Price/Dry Ton	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18
Total Revenue - Lignin Residue	0	0	29,254	51,512	89,034	89,034	89,034	89,034	89,034	89,034	89,034
CO_2											
Tons Produced	0	0	3,125	4,688	6,250	6,250	6,250	6,250	6,250	6,250	6,250
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	3,125	4,688	6,250	6,250	6,250	6,250	6,250	6,250	6,250
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	1,227,165	2,074,757	3,390,365	3,390,365	3,390,365	3,390,365	3,390,365	3,390,365	3,390,365

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	13,935	20,903	27,871	27,871	27,871	27,871	27,871	27,871	27,871
BDT Biomass to Inventory	0	0	9,556	9,556	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860
Biomass Expense	0	0	795,405	1,031,331	943,701	943,701	943,701	943,701	943,701	943,701	943,701
Total Feedstock Expense	0	0	795,405	1,031,331	943,701	943,701	943,701	943,701	943,701	943,701	943,701
Electricity (KWH)	0	0	1,775,000	2,662,500	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000	3,550,000
$/KWH	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300
Electricity Expense	0	0	53,250	79,875	106,500	106,500	106,500	106,500	106,500	106,500	106,500
Natural Gas (MMBTU)	0	0	46,029	69,044	92,059	92,059	92,059	92,059	92,059	92,059	92,059
$/MMBTU	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000
Natural Gas Expense	0	0	138,088	207,132	276,176	276,176	276,176	276,176	276,176	276,176	276,176
Makeup Water ('000 Gal.)	0	0	7,474	11,211	14,947	14,947	14,947	14,947	14,947	14,947	14,947
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	3,737	5,605	7,474	7,474	7,474	7,474	7,474	7,474	7,474
Effluent Disposal ('000 Gal)	0	0	4,777	7,166	9,554	9,554	9,554	9,554	9,554	9,554	9,554
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	4,777	7,166	9,554	9,554	9,554	9,554	9,554	9,554	9,554
Solid Waste Disposal (Tons)	0	0	1,206	1,809	2,412	2,412	2,412	2,412	2,412	2,412	2,412
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	12,059	18,088	24,117	24,117	24,117	24,117	24,117	24,117	24,117
Labor & Benefits	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875	196,875
Maintenance Materials & Services	0	0	43,291	64,936	86,582	86,582	86,582	86,582	86,582	86,582	86,582
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	43,750	65,625	87,500	87,500	87,500	87,500	87,500	87,500	87,500
Purchased Cellulase Enzymes	0	0	126,000	189,000	252,000	252,000	252,000	252,000	252,000	252,000	252,000
Other Chemicals	0	0	96,625	144,938	193,250	193,250	193,250	193,250	193,250	193,250	193,250
Office/Lab Supplies & Expenses	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Total Monthly Expense (non-feedstock)	202,875	202,875	724,451	1,003,990	1,264,778	1,264,778	1,264,778	1,264,778	1,264,778	1,264,778	1,264,778
Total Monthly Profit (Loss)	(202,875)	(202,875)	(292,691)	39,436	1,181,886	1,181,886	1,181,886	1,181,886	1,181,886	1,181,886	1,181,886

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	441,702	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	508,119
2	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
3	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
4	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
5	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
6	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
7	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
8	0	$41,667	10,000	2,000	2,000	7,500	0	1,000	2,250	66,417
9	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
10	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
11	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
12	0	$41,667	10,000	2,000	2,000	7,500	4,000	1,000	2,650	70,817
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	441,702	500,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,373,452

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(3)	(1)	(2)	(4)	(12)	(12)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
14	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
15	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
16	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
17	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
18	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
19	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
20	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
21	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
22	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
23	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000
24	9,167	6,667	5,000	5,417	5,000	6,000	3,750	4,667	14,667	30,000	25,000

Interim Period Labor Summary
Months 1-24

Position Number Employed Annual Salary	Maintenance Manager (1) 50,000	Boiler Operator (1) 40,000	Maintenance Worker (4) 33,000	Welder (1) 35,000	Electrician (1) 35,000	Instrument Technician (2) 37,000	Monthly Total (49)	Benefits at 35.00%	Total
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
14	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
15	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
16	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
17	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
18	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
19	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
20	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
21	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
22	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
23	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875
24	4,167	3,333	11,000	2,917	2,917	6,167	145,833	51,042	196,875

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	52,500,000
Anhydrous Ethanol Production (gal/yr)	50,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0690	$0.0704	$0.0718	$0.0732	$0.0747	$0.0762	$0.0777	$0.0793	$0.0808	$0.0825	2.00%
State Producer Payment ($/gal)	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Delivered Biomass Price ($/BDT)	$33.860	$34.199	$34.541	$34.886	$35.235	$35.587	$35.943	$36.303	$36.666	$37.032	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	557,414	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$3.181	$3.213	$3.245	$3.278	$3.310	$3.343	$3.377	$3.411	$3.445	$3.479	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0300	$0.0306	$0.0312	$0.0318	$0.0325	$0.0331	$0.0338	$0.0345	$0.0351	$0.0359	2.00%
Natural Gas Use (MMBTU/BDT)	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	
Natural Gas Price ($/MMBTU)	$3.0000	$3.0600	$3.1212	$3.1836	$3.2473	$3.3122	$3.3785	$3.4461	$3.5150	$3.5853	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	60	60	60	60	60	60	60	60	60	60	
Average Salary Including Benefits	$46,350	$47,509	$48,696	$49,914	$51,162	$52,441	$53,752	$55,096	$56,473	$57,885	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$73,281,000		
Engineering Expense	$7,022,687		
Construction Management	$5,632,300		
Contingency	$6,468,265		
Total	$92,404,000	$1.85	per gallon
Owner's Costs			
Inventory - Biomass	$539,000		
Inventory - Chemicals/Denaturant	$216,000		
Inventory - Ethanol & Lignin	$1,395,000		
Spare Parts	$600,000		
Startup Costs	$1,200,000		
Land	$225,000		
Administration Building & Furnishing	$300,000		
Rail Improvements	$750,000		
Site Development Costs	$1,200,000		
Tools and Laboratory Equipment	$250,000		
Organizational Costs	$600,000		
Capitalized Fees and Interest	$2,865,000		
Working Capital	$462,000		
Total Estimated Project Cost	$103,006,000		
Senior Debt			
Principal	$61,803,600	60.00%	
Interest Rate	8.0%	fixed	
Lender Fees	$618,036	1.000%	
Placement Fees	$0	0.000%	
Amortization Period	10	years	
Cash Sweep	0.000%		
Subordinated Debt			
Principal	$0	0.00%	
Interest Rate	0.00%		
Lender Fees	$0	0.000%	
Placement Fees	$0.00	0.000%	
Amortization Period	0	years	
Common Equity Investment			
Total Equity Amount	$41,202,400	40.00%	
Placement Fees	$0	0.000%	
Preferred Shares	$0	0.000%	
Common Shares	$41,202,400	100.000%	
Grants			

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Tax Incentives ($/gal)

Year	Blenders Credit Federal	Blenders Credit State	State Producer Payment
1	$0.052	$0.000	$0.056
2	$0.052	$0.000	$0.056
3	$0.051	$0.000	$0.056
4	$0.051	$0.000	$0.056
5	$0.051	$0.000	$0.056
6	$0.051	$0.000	$0.056
7	$0.051	$0.000	$0.056
8	$0.051	$0.000	$0.056
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.180
Annual payment cap	$2,812,500
State incentive duration, years	8

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	6,141,963	16,904,905	28,362,404	40,530,130	53,423,757	67,059,181	81,452,514	96,620,074	109,765,887	123,719,170
Accounts Receivable - Trade	0	1,777,807	1,778,602	1,813,660	1,849,414	1,885,879	1,923,067	1,960,993	1,999,673	2,039,121	2,079,353
Inventories											
Feedstock	0	1,078,516	1,089,301	1,100,194	1,111,196	1,122,308	1,133,531	1,144,866	1,156,315	1,167,878	1,179,557
Purchased Cellulase Enzymes	0	216,000	218,160	220,342	222,545	224,770	227,018	229,288	231,581	233,897	236,236
Other Chemicals	0	165,643	167,299	168,972	170,662	172,369	174,092	175,833	177,592	179,367	181,161
Denaturant	0	50,000	51,000	52,020	53,060	54,122	55,204	56,308	57,434	58,583	59,755
Finished Product Inventory	0	1,341,048	1,422,882	1,450,928	1,479,532	1,508,703	1,538,453	1,568,795	1,599,739	1,631,297	1,663,482
Total Inventories	0	2,851,206	2,948,642	2,992,456	3,036,995	3,082,271	3,128,299	3,175,091	3,222,660	3,271,022	3,320,191
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	10,770,977	21,632,149	33,168,520	45,416,539	58,391,907	72,110,547	86,588,598	101,842,408	115,076,030	129,118,713
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	81,703,645	95,504,252	95,604,252	95,704,252	95,804,252	95,904,252	96,004,252	96,104,252	96,204,252	96,304,252	96,404,252
Less Accumulated Depreciation & Amortiz.	0	2,090,999	6,366,679	10,647,359	14,933,039	19,223,719	23,519,399	27,820,079	32,125,759	36,436,439	40,752,119
Net Property, Plant & Equipment	81,703,645	93,413,253	89,237,573	85,056,893	80,871,213	76,680,533	72,484,853	68,284,173	64,078,493	59,867,813	55,652,133
Capitalized Fees & Interest	1,353,027	2,860,973	2,574,875	2,288,778	2,002,681	1,716,584	1,430,486	1,144,389	858,292	572,195	286,097
Total Assets	83,281,672	107,270,202	113,669,597	120,739,191	128,515,432	137,014,023	146,250,886	156,242,159	167,004,192	175,741,037	185,281,943
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	733,931	762,950	771,089	779,320	787,644	796,062	804,574	813,183	821,889	830,694
Notes Payable	0	0	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	4,435,505	4,803,649	5,202,350	5,634,142	6,101,774	6,608,218	7,156,697	7,750,699	8,394,003	2,950,062
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	5,169,436	5,566,599	5,973,439	6,413,463	6,889,418	7,404,279	7,961,271	8,563,882	9,215,892	3,780,756
Long Term Debt (excluding current maturities	42,966,087	54,601,593	49,797,944	44,595,594	38,961,451	32,859,678	26,251,460	19,094,764	11,344,065	2,950,062	0
Subordinated Debt (excluding current maturiti	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities	42,966,087	59,771,029	55,364,543	50,569,033	45,374,914	39,749,095	33,655,740	27,056,035	19,907,947	12,165,954	3,780,756
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400	41,202,400
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(886,815)	6,296,773	17,102,654	28,967,758	41,938,118	56,062,528	71,392,746	87,983,725	105,893,846	122,372,683	140,298,787
Total Capital Shares & Equities	40,315,585	47,499,173	58,305,054	70,170,158	83,140,518	97,264,928	112,595,146	129,186,125	147,096,246	163,575,083	181,501,187
Total Liabilities & Equities	83,281,672	107,270,202	113,669,597	120,739,191	128,515,432	137,014,023	146,250,886	156,242,159	167,004,192	175,741,037	185,281,943

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	44,330,492	60,452,595	61,661,647	62,894,880	64,152,777	65,435,833	66,744,550	68,079,441	69,441,029	70,829,850
Lignin Residue	0	1,321,724	1,798,477	1,816,462	1,834,627	1,852,973	1,871,503	1,890,218	1,909,120	1,928,211	1,947,493
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	2,208,867	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	0	0
Federal Small Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Total Sales	0	47,861,083	65,063,572	66,290,609	67,542,006	68,818,250	70,119,836	71,447,267	72,801,060	71,369,241	72,777,343
Production & Operating Expenses											
Feedstocks	0	15,627,243	19,062,765	19,253,392	19,445,926	19,640,386	19,836,789	20,035,157	20,235,509	20,437,864	20,642,243
Purchased Cellulase Enzymes	0	3,885,000	5,090,400	5,141,304	5,192,717	5,244,644	5,297,091	5,350,062	5,403,562	5,457,598	5,512,174
Other Chemicals	0	2,979,271	3,903,650	3,942,687	3,982,113	4,021,934	4,062,154	4,102,775	4,143,803	4,185,241	4,227,094
Utilities - Natural Gas	0	4,257,717	5,633,996	5,746,675	5,861,609	5,978,841	6,098,418	6,220,386	6,344,794	6,471,690	6,601,124
Electricity	0	1,641,875	2,172,600	2,216,052	2,260,373	2,305,581	2,351,692	2,398,726	2,446,700	2,495,634	2,545,547
Denaturants	0	1,348,958	1,785,000	1,820,700	1,857,114	1,894,256	1,932,141	1,970,784	2,010,200	2,050,404	2,091,412
Makeup Water	0	115,220	150,969	152,479	154,003	155,543	157,099	158,670	160,256	161,859	163,478
Wastewater Disposal	0	147,293	192,994	194,924	196,873	198,842	200,830	202,839	204,867	206,916	208,985
Solid Waste Disposal	0	371,804	487,163	492,035	496,955	501,925	506,944	512,014	517,134	522,305	527,528
Direct Labor & Benefits	0	1,561,950	1,600,999	1,641,024	1,682,049	1,724,101	1,767,203	1,811,383	1,856,668	1,903,084	1,950,662
Total Production Costs	0	31,936,331	40,080,535	40,601,271	41,129,734	41,666,053	42,210,362	42,762,796	43,323,494	43,892,595	44,470,245
Gross Profit	0	15,924,752	24,983,037	25,689,337	26,412,273	27,152,198	27,909,474	28,684,471	29,477,567	27,476,645	28,307,098
Administrative & Operating Expenses											
Maintenance Materials & Services	0	1,129,749	1,487,604	1,509,918	1,532,567	1,555,556	1,578,889	1,602,572	1,626,611	1,651,010	1,675,775
Enzymes & Chemicals	0	583,200	597,780	612,725	628,043	643,744	659,837	676,333	693,242	710,573	728,337
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	327,715	1,638,573	1,891,493	1,825,215	1,757,320	1,687,781	1,616,570	1,543,659	1,469,022	1,392,629	1,314,452
Admin. Salaries, Wages & Benefits	148,500	635,850	651,746	668,040	684,741	701,859	719,406	737,391	755,826	774,721	794,090
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	96,000	96,000	97,920	99,878	101,876	103,913	105,992	108,112	110,274	112,479	114,729
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(886,815)	11,746,730	20,159,951	20,875,087	21,607,282	22,356,892	23,124,279	23,909,813	24,713,870	22,724,335	23,566,600
Less:											
Interest - Operating Line of Credit	0	0	0	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	2,472,144	4,792,292	4,443,206	4,065,145	3,655,706	3,212,283	2,732,057	2,211,972	1,648,720	1,038,718
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	2,090,999	4,561,777	4,566,777	4,571,777	4,576,777	4,581,777	4,586,777	4,591,777	4,596,777	4,601,777
Pre-Tax Income	(886,815)	7,183,587	10,805,881	11,865,104	12,970,360	14,124,409	15,330,219	16,590,979	17,910,121	16,478,838	17,926,104
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(886,815)	7,183,587	10,805,881	11,865,104	12,970,360	14,124,409	15,330,219	16,590,979	17,910,121	16,478,838	17,926,104

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(886,815)	7,183,587	10,805,881	11,865,104	12,970,360	14,124,409	15,330,219	16,590,979	17,910,121	16,478,838	17,926,104
Non cash charges to operations											
Depreciation & Amortization	0	2,090,999	4,561,777	4,566,777	4,571,777	4,576,777	4,581,777	4,586,777	4,591,777	4,596,777	4,601,777
	(886,815)	9,274,586	15,367,659	16,431,881	17,542,137	18,701,186	19,911,996	21,177,756	22,501,898	21,075,615	22,527,881
Changes in non-cash working capital balances											
Accounts Receivable	0	1,777,807	795	35,058	35,754	36,464	37,188	37,927	38,680	39,448	40,232
Inventories	0	2,851,206	97,436	43,814	44,539	45,277	46,027	46,792	47,570	48,362	49,168
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(733,931)	(29,018)	(8,139)	(8,231)	(8,324)	(8,418)	(8,513)	(8,609)	(8,706)	(8,805)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	3,895,082	69,212	70,733	72,062	73,417	74,798	76,206	77,641	79,104	80,595
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	81,703,645	13,800,607	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	1,353,027	1,507,945	0	0	0	0	0	0	0	0	0
	83,281,672	15,308,553	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	42,966,087	18,837,513	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(2,766,502)	(4,435,505)	(4,803,649)	(5,202,350)	(5,634,142)	(6,101,774)	(6,608,218)	(7,156,697)	(7,750,699)	(8,394,003)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	41,202,400	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	6,141,963	10,762,942	11,457,499	12,167,725	12,893,627	13,635,424	14,393,332	15,167,561	13,145,812	13,953,283
Cash (Indebtedness), Beginning of Year	0	0	6,141,963	16,904,905	28,362,404	40,530,130	53,423,757	67,059,181	81,452,514	96,620,074	109,765,887
Cash (Bank Indebtedness), End of Year	0	6,141,963	16,904,905	28,362,404	40,530,130	53,423,757	67,059,181	81,452,514	96,620,074	109,765,887	123,719,170

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
1	6,996,732	692,786	12,375	7,701,893	(41,202,400)	0	(83,751)	(33,584,258)
2	6,771,732	74,750	12,375	6,858,857	0	0	(66,814)	(26,792,214)
3	6,771,732	74,750	12,375	6,858,857	0	0	(49,833)	(19,983,190)
4	6,771,732	74,750	12,375	6,858,857	0	0	(32,811)	(13,157,144)
5	6,771,732	74,750	12,375	6,858,857	0	0	(41,989)	(6,340,275)
6	6,771,732	74,750	12,375	6,858,857	0	0	3,457	522,039
7	6,959,232	74,750	12,375	7,046,357	0	0	50,456	7,618,853
8	6,862,804	74,750	12,375	6,949,929	0	0	97,125	14,665,907
9	6,862,804	79,150	12,375	6,954,329	0	0	144,135	21,764,370
10	6,862,804	79,150	12,375	6,954,329	0	0	191,458	28,910,157
11	6,675,304	79,150	12,375	6,766,829	0	0	237,847	35,914,832
12	6,850,304	79,150	12,375	6,941,829	0	0	285,711	43,142,372
13	7,200,304	19,250	239,750	7,459,304	0	0	337,345	50,939,020
14	6,600,304	19,250	239,750	6,859,304	0	0	385,322	58,183,646
15	0	19,250	493,454	512,704	0	0	391,309	59,087,659
16	0	6,600	1,162	7,762	0	0	393,969	59,489,390
17	0	6,600	0	6,600	0	0	396,640	59,892,630
18	0	6,600	0	6,600	0	0	399,328	60,298,559
19	0	6,600	0	6,600	0	0	399,328	60,704,487
20	0	6,600	0	6,600	0	0	399,328	61,110,415
21	0	6,600	0	6,600	0	0	399,328	61,516,343
22	0	6,600	0	6,600	0	0	399,328	61,922,271
23	0	6,600	0	6,600	0	0	399,328	62,328,200
24	0	6,600	0	6,600	0	0	399,328	62,734,128
Total	95,729,252	1,649,786	1,085,491	98,501,654	(41,202,400)	0	5,434,874	62,734,128

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improve-ments	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	171,429	0	5,234,357	501,621	402,307	462,019	6,996,732
2	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
3	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
4	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
5	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
6	0	0	171,429	0	5,234,357	501,621	402,307	462,019	6,771,732
7	0	0	171,429	187,500	5,234,357	501,621	402,307	462,019	6,959,232
8	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
9	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
10	0	0	75,000	187,500	5,234,357	501,621	402,307	462,019	6,862,804
11	0	0	75,000	0	5,234,357	501,621	402,307	462,019	6,675,304
12	0	250,000	0	0	5,234,357	501,621	402,307	462,019	6,850,304
13	0	600,000	0	0	5,234,357	501,621	402,307	462,019	7,200,304
14	0	0	0	0	5,234,357	501,621	402,307	462,019	6,600,304
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	850,000	1,500,000	750,000	73,281,000	7,022,687	5,632,300	6,468,265	95,729,252

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	2,083,333	3,125,000	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667	4,166,667
Gallons Sent to Inventory	0	0	571,429	571,429	0	0	0	0	0	0	0
Denaturant Added	0	0	104,167	156,250	208,333	208,333	208,333	208,333	208,333	208,333	208,333
Net Gallons Sold (Denatured)	0	0	1,587,500	2,681,250	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000	4,375,000
Selling Price/Gallon (FOB Plant)	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289
State Producer Payment	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056	$0.056
Federal Small Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Revenue - Fuel Ethanol	0	0	1,881,426	3,177,683	5,185,031	5,185,031	5,185,031	5,185,031	5,185,031	5,185,031	5,185,031
Lignin Residue											
Dry Tons Produced	0	0	23,323	34,984	46,646	46,646	46,646	46,646	46,646	46,646	46,646
Tons Sent to Inventory	0	0	7,996	7,996	0	0	0	0	0	0	0
Net Tons Sold	0	0	15,326	26,988	46,646	46,646	46,646	46,646	46,646	46,646	46,646
Selling Price/Dry Ton	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18
Total Revenue - Lignin Residue	0	0	48,756	85,854	148,389	148,389	148,389	148,389	148,389	148,389	148,389
CO_2											
Tons Produced	0	0	5,208	7,813	10,417	10,417	10,417	10,417	10,417	10,417	10,417
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	5,208	7,813	10,417	10,417	10,417	10,417	10,417	10,417	10,417
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	1,930,182	3,263,537	5,333,420	5,333,420	5,333,420	5,333,420	5,333,420	5,333,420	5,333,420

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	23,226	34,838	46,451	46,451	46,451	46,451	46,451	46,451	46,451
BDT Biomass to Inventory	0	0	15,926	15,926	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860
Biomass Expense	0	0	1,325,676	1,718,884	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835
Total Feedstock Expense	0	0	1,325,676	1,718,884	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835	1,572,835
Electricity (KWH)	0	0	2,958,333	4,437,500	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667	5,916,667
$/KWH	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300
Electricity Expense	0	0	88,750	133,125	177,500	177,500	177,500	177,500	177,500	177,500	177,500
Natural Gas (MMBTU)	0	0	76,716	115,073	153,431	153,431	153,431	153,431	153,431	153,431	153,431
$/MMBTU	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000
Natural Gas Expense	0	0	230,147	345,220	460,294	460,294	460,294	460,294	460,294	460,294	460,294
Makeup Water ('000 Gal.)	0	0	12,456	18,684	24,912	24,912	24,912	24,912	24,912	24,912	24,912
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	6,228	9,342	12,456	12,456	12,456	12,456	12,456	12,456	12,456
Effluent Disposal ('000 Gal)	0	0	7,962	11,943	15,924	15,924	15,924	15,924	15,924	15,924	15,924
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	7,962	11,943	15,924	15,924	15,924	15,924	15,924	15,924	15,924
Solid Waste Disposal (Tons)	0	0	2,010	3,015	4,020	4,020	4,020	4,020	4,020	4,020	4,020
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	20,098	30,146	40,195	40,195	40,195	40,195	40,195	40,195	40,195
Labor & Benefits	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750	231,750
Maintenance Materials & Services	0	0	61,068	91,601	122,135	122,135	122,135	122,135	122,135	122,135	122,135
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	72,917	109,375	145,833	145,833	145,833	145,833	145,833	145,833	145,833
Purchased Cellulase Enzymes	0	0	210,000	315,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000
Other Chemicals	0	0	161,042	241,563	322,083	322,083	322,083	322,083	322,083	322,083	322,083
Office/Lab Supplies & Expenses	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Total Monthly Expense (non-feedstock)	239,750	239,750	1,097,960	1,545,815	1,974,920	1,974,920	1,974,920	1,974,920	1,974,920	1,974,920	1,974,920
Total Monthly Profit (Loss)	(239,750)	(239,750)	(493,454)	(1,162)	1,785,665	1,785,665	1,785,665	1,785,665	1,785,665	1,785,665	1,785,665

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	618,036	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	692,786
2	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
3	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
4	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
5	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
6	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
7	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
8	0	$50,000	10,000	2,000	2,000	7,500	0	1,000	2,250	74,750
9	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
10	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
11	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
12	0	$50,000	10,000	2,000	2,000	7,500	4,000	1,000	2,650	79,150
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	618,036	600,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,649,786

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(4)	(1)	(2)	(4)	(16)	(16)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
14	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
15	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
16	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
17	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
18	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
19	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
20	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
21	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
22	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
23	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333
24	9,167	6,667	5,000	5,417	5,000	8,000	3,750	4,667	14,667	40,000	33,333

Interim Period Labor Summary
Months 1-24

Position	Maintenance Manager	Boiler Operator	Maintenance Worker	Welder	Electrician	Instrument Technician	Monthly Total	Benefits at	Total
Number Employed	(1)	(1)	(6)	(1)	(1)	(2)	(60)	35.00%	
Annual Salary	50,000	40,000	33,000	35,000	35,000	37,000			
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
14	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
15	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
16	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
17	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
18	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
19	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
20	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
21	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
22	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
23	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750
24	4,167	3,333	16,500	2,917	2,917	6,167	171,667	60,083	231,750

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production Assumptions

Denatured Fuel Ethanol (gal/yr)	73,500,000
Anhydrous Ethanol Production (gal/yr)	70,000,000
Operating Days Per Year	350

Product Yields & Energy Consumption	1st year Operations	2nd year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations	Annual Escalation
Ethanol Yield (gal/BDT)	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	89.700	
Net Ethanol Selling Price ($/gal)	$1.210	$1.234	$1.259	$1.284	$1.310	$1.336	$1.363	$1.390	$1.418	$1.446	2.00%
Ethanol Sales Commission (%)	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	1.000%	0.00%
Ethanol Transportation ($/gal)	$0.0690	$0.0704	$0.0718	$0.0732	$0.0747	$0.0762	$0.0777	$0.0793	$0.0808	$0.0825	2.00%
State Producer Payment ($/gal)	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.000	$0.000	
Federal Small Producer Payment ($/gal)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Delivered Biomass Price ($/BDT)	$33.860	$34.199	$34.541	$34.886	$35.235	$35.587	$35.943	$36.303	$36.666	$37.032	1.00%
Biomass Transportation & Storage ($/BDT)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.50%
Biomass Usage (BDT/yr)	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	780,379	
Biomass Test Weight (lb/BDT)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Lignin Residue Yield (wet lb/BDT)	2,008.376	2,008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	2008.376	
Lignin Residue Price ($/wet ton)	$3.181	$3.213	$3.245	$3.278	$3.310	$3.343	$3.377	$3.411	$3.445	$3.479	1.00%
Lignin Residue Transportation ($/wet ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	2.00%
Lignin Sales Commission (% of sales)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.00%
Carbon Dioxide (CO2) Sold (lb/gal)	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	
CO2 Price ($/ton)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	1.00%
Electricity Use (kWh/BDT)	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	127.374	
Electricity Price ($/kWh)	$0.0300	$0.0306	$0.0312	$0.0318	$0.0325	$0.0331	$0.0338	$0.0345	$0.0351	$0.0359	2.00%
Natural Gas Use (MMBTU/BDT)	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	3.3031	
Natural Gas Price ($/MMBTU)	$3.0000	$3.0600	$3.1212	$3.1836	$3.2473	$3.3122	$3.3785	$3.4461	$3.5150	$3.5853	2.00%
Fresh Water Use (1000 gal/BDT)	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	
Fresh Water Price ($/1000 gal)	$0.5000	$0.5050	$0.5101	$0.5152	$0.5203	$0.5255	$0.5308	$0.5361	$0.5414	$0.5468	1.00%
Wastewater Effluent (1000 gal/BDT)	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	
Wastewater Effluent Price ($/1000 gal)	$1.0000	$1.0100	$1.0201	$1.0303	$1.0406	$1.0510	$1.0615	$1.0721	$1.0829	$1.0937	1.00%
Solid Waste Disposal (ton/BDT)	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	0.087	
Solid Waste Disposal Price ($/Ton)	$10.0000	$10.1000	$10.2010	$10.3030	$10.4060	$10.5101	$10.6152	$10.7214	$10.8286	$10.9369	1.00%
Denaturant Use (% of ethanol sold)	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	5.000%	
Denaturant Price ($/gal)	$0.7000	$0.7140	$0.7283	$0.7428	$0.7577	$0.7729	$0.7883	$0.8041	$0.8202	$0.8366	2.00%
Purchased Cellulase Enzyme ($/gal etoh)	$0.1008	$0.1018	$0.1028	$0.1039	$0.1049	$0.1059	$0.1070	$0.1081	$0.1092	$0.1102	1.00%
Other Chemical Costs ($/gal ethanol)	$0.0773	$0.0781	$0.0789	$0.0796	$0.0804	$0.0812	$0.0821	$0.0829	$0.0837	$0.0845	1.00%
Number of Employees	71	71	71	71	71	71	71	71	71	71	
Average Salary Including Benefits	$45,063	$46,190	$47,345	$48,528	$49,742	$50,985	$52,260	$53,566	$54,905	$56,278	2.50%
Maintenance Materials & Services	2.000%	2.030%	2.060%	2.091%	2.123%	2.155%	2.187%	2.220%	2.253%	2.287%	1.50%
Property Tax & Insurance	2.000%	2.020%	2.040%	2.061%	2.081%	2.102%	2.123%	2.144%	2.166%	2.187%	1.00%
All Other Expense Categories											2.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Financial Assumptions

Ethanol Plant Engineering & Construction Costs			
Capital Equipment Cost & Installation	$92,478,000		
Engineering Expense	$8,860,213		
Construction Management	$7,083,090		
Contingency	$8,160,723		
Total	$116,582,000	$1.67	per gallon
Owner's Costs			
Inventory - Biomass	$755,000		
Inventory - Chemicals/Denaturant	$302,000		
Inventory - Ethanol & Lignin	$1,954,000		
Spare Parts	$700,000		
Startup Costs	$1,400,000		
Land	$225,000		
Administration Building & Furnishing	$350,000		
Rail Improvements	$1,000,000		
Site Development Costs	$1,400,000		
Tools and Laboratory Equipment	$250,000		
Organizational Costs	$700,000		
Capitalized Fees and Interest	$3,591,000		
Working Capital	$490,000		
Total Estimated Project Cost	$129,699,000		
Senior Debt			
Principal	$77,819,400	60.00%	
Interest Rate	8.0%	fixed	
Lender Fees	$778,194	1.000%	
Placement Fees	$0	0.000%	
Amortization Period	10	years	
Cash Sweep	0.000%		
Subordinated Debt			
Principal	$0	0.00%	
Interest Rate	0.00%		
Lender Fees	$0	0.000%	
Placement Fees	$0.00	0.000%	
Amortization Period	0	years	
Common Equity Investment			
Total Equity Amount	$51,879,600	40.00%	
Placement Fees	$0	0.000%	
Preferred Shares	$0	0.000%	
Common Shares	$51,879,600	100.000%	
Grants			
Amount	$0	0.00%	

	Receivable (#Days)	Accounts Payable (#Days)	Inventories (#Days)
Fuel Ethanol	10		8
Lignin Residue	10		8
Denaturants		10	10
Enzymes & Chemicals		15	15
Biomass		10	20
Utilities		15	

Tax Incentives ($/gal)

	Blenders Credit		State Producer
Year	Federal	State	Payment
1	$0.052	$0.000	$0.040
2	$0.052	$0.000	$0.040
3	$0.051	$0.000	$0.040
4	$0.051	$0.000	$0.040
5	$0.051	$0.000	$0.040
6	$0.051	$0.000	$0.040
7	$0.051	$0.000	$0.040
8	$0.051	$0.000	$0.040
9	$0.051	$0.000	$0.000
10	$0.051	$0.000	$0.000

State producer payment, ¢/gal	$0.180
Annual payment cap	$2,812,500
State incentive duration, years	8

Income Tax Rate	0.00%
Investment Interest	3.00%
Operating Line Interest	10.00%

Month	Plant Operating Rate
13	0.00%
14	0.00%
15	50.00%
16	75.00%
17	100.00%
18	100.00%
19	100.00%
20	100.00%
21	100.00%
22	100.00%
23	100.00%
24	100.00%

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Balance Sheet

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
ASSETS											
Current Assets:											
Cash & Cash Equivalents	0	9,287,481	25,774,700	43,282,975	61,801,922	81,354,006	101,962,027	123,649,115	146,438,728	167,542,141	189,795,940
Accounts Receivable - Trade	0	2,456,117	2,490,043	2,539,124	2,589,180	2,640,230	2,692,293	2,745,391	2,799,542	2,854,770	2,911,094
Inventories											
Feedstock	0	1,509,922	1,525,021	1,540,271	1,555,674	1,571,231	1,586,943	1,602,813	1,618,841	1,635,029	1,651,379
Purchased Cellulase Enzymes	0	302,400	305,424	308,478	311,563	314,679	317,825	321,004	324,214	327,456	330,730
Other Chemicals	0	231,900	234,219	236,561	238,927	241,316	243,729	246,167	248,628	251,114	253,626
Denaturant	0	70,000	71,400	72,828	74,285	75,770	77,286	78,831	80,408	82,016	83,656
Finished Product Inventory	0	1,877,467	1,992,034	2,031,299	2,071,344	2,112,184	2,153,835	2,196,313	2,239,634	2,283,816	2,328,875
Total Inventories	0	3,991,689	4,128,098	4,189,438	4,251,793	4,315,180	4,379,618	4,445,127	4,511,725	4,579,431	4,648,267
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Other Current Assets	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	15,735,287	32,392,841	50,011,538	68,642,895	88,309,416	109,033,938	130,839,632	153,749,995	174,976,342	197,355,301
Land	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000
Property, Plant & Equipment											
Property, Plant & Equipment, at cost	102,927,451	120,282,026	120,382,026	120,482,026	120,582,026	120,682,026	120,782,026	120,882,026	120,982,026	121,082,026	121,182,026
Less Accumulated Depreciation & Amortiz.	0	2,640,810	8,027,000	13,418,190	18,814,380	24,215,570	29,621,760	35,032,950	40,449,140	45,870,330	51,296,520
Net Property, Plant & Equipment	102,927,451	117,641,217	112,355,027	107,063,837	101,767,647	96,466,457	91,160,267	85,849,077	80,532,887	75,211,697	69,885,507
Capitalized Fees & Interest	1,695,374	3,587,225	3,228,503	2,869,780	2,511,058	2,152,335	1,793,613	1,434,890	1,076,168	717,445	358,723
Total Assets	104,847,826	137,188,729	148,201,371	160,170,155	173,146,600	187,153,208	202,212,818	218,348,599	235,584,049	251,130,483	267,824,530
LIABILITIES & EQUITIES											
Current Liabilities:											
Accounts Payable	0	1,027,504	1,068,130	1,079,525	1,091,048	1,102,702	1,114,486	1,126,404	1,138,457	1,150,645	1,162,972
Notes Payable	0	0	0	0	0	0	0	0	0	0	0
Current Maturities of Long Term Debt	0	5,584,923	6,048,468	6,550,488	7,094,176	7,682,989	8,320,673	9,011,285	9,759,217	10,569,227	3,714,542
Current maturities of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	0	6,612,426	7,116,598	7,630,013	8,185,224	8,785,690	9,435,159	10,137,689	10,897,673	11,719,872	4,877,513
Long Term Debt (excluding current maturities	53,963,935	68,751,063	62,702,595	56,152,107	49,057,931	41,374,943	33,054,270	24,042,985	14,283,768	3,714,542	0
Subordinated Debt (excluding current maturiti	0	0	0	0	0	0	0	0	0	0	0
Deferred Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities	53,963,935	75,363,490	69,819,193	63,782,120	57,243,155	50,160,633	42,489,429	34,180,674	25,181,442	15,434,414	4,877,513
Capital Shares & Equities											
Preferred Shares	0	0	0	0	0	0	0	0	0	0	0
Common Shares	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600	51,879,600
Grants	0	0	0	0	0	0	0	0	0	0	0
Retained Earnings	(995,710)	9,945,639	26,502,578	44,508,435	64,023,844	85,112,975	107,843,788	132,288,325	158,523,007	183,816,470	211,067,417
Total Capital Shares & Equities	50,883,890	61,825,239	78,382,178	96,388,035	115,903,444	136,992,575	159,723,388	184,167,925	210,402,607	235,696,070	262,947,017
Total Liabilities & Equities	104,847,826	137,188,729	148,201,371	160,170,155	173,146,600	187,153,208	202,212,818	218,348,599	235,584,049	251,130,483	267,824,530

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Income Statements

	Construction (Year 0)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Sales											
Ethanol	0	62,062,689	84,633,633	86,326,306	88,052,832	89,813,888	91,610,166	93,442,370	95,311,217	97,217,441	99,161,790
Lignin Residue	0	1,850,413	2,517,868	2,543,047	2,568,477	2,594,162	2,620,104	2,646,305	2,672,768	2,699,495	2,726,490
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0
State Producer Payment	0	2,208,867	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	2,812,500	0	0
Federal Small Producer Payment	0	0	0	0	0	0	0	0	0	0	0
Total Sales	0	66,121,969	89,964,001	91,681,853	93,433,809	95,220,551	97,042,770	98,901,174	100,796,485	99,916,937	101,888,280
Production & Operating Expenses											
Feedstocks	0	21,878,140	26,687,871	26,954,749	27,224,297	27,496,540	27,771,505	28,049,220	28,329,713	28,613,010	28,899,140
Purchased Cellulase Enzymes	0	5,439,000	7,126,560	7,197,826	7,269,804	7,342,502	7,415,927	7,490,086	7,564,987	7,640,637	7,717,043
Other Chemicals	0	4,170,979	5,465,110	5,519,761	5,574,959	5,630,708	5,687,015	5,743,886	5,801,324	5,859,338	5,917,931
Utilities - Natural Gas	0	5,960,804	7,887,594	8,045,346	8,206,252	8,370,378	8,537,785	8,708,541	8,882,712	9,060,366	9,241,573
Electricity	0	2,298,625	3,041,640	3,102,473	3,164,522	3,227,813	3,292,369	3,358,216	3,425,381	3,493,888	3,563,766
Denaturants	0	1,888,542	2,499,000	2,548,980	2,599,960	2,651,959	2,704,998	2,759,098	2,814,280	2,870,565	2,927,977
Makeup Water	0	161,307	211,356	213,470	215,605	217,761	219,938	222,138	224,359	226,603	228,869
Wastewater Disposal	0	206,210	270,191	272,893	275,622	278,379	281,162	283,974	286,814	289,682	292,579
Solid Waste Disposal	0	520,525	682,029	688,849	695,738	702,695	709,722	716,819	723,987	731,227	738,539
Direct Labor & Benefits	0	1,858,950	1,905,424	1,953,059	2,001,886	2,051,933	2,103,231	2,155,812	2,209,707	2,264,950	2,321,574
Total Production Costs	0	44,383,083	55,776,775	56,497,406	57,228,644	57,970,666	58,723,653	59,487,790	60,263,263	61,050,265	61,848,991
Gross Profit	0	21,738,886	34,187,226	35,184,446	36,205,165	37,249,884	38,319,117	39,413,384	40,533,221	38,866,671	40,039,290
Administrative & Operating Expenses											
Maintenance Materials & Services	0	1,425,703	1,877,303	1,905,463	1,934,045	1,963,056	1,992,501	2,022,389	2,052,725	2,083,516	2,114,768
Maintenance - Wages & Benefits	0	672,300	689,108	706,335	723,994	742,093	760,646	779,662	799,153	819,132	839,611
Consulting Services	114,000	24,000	24,480	24,970	25,469	25,978	26,498	27,028	27,568	28,120	28,682
Property Taxes & Insurance	412,610	2,063,049	2,380,898	2,296,858	2,210,796	2,122,679	2,032,474	1,940,146	1,845,661	1,748,984	1,650,080
Admin. Salaries, Wages & Benefits	148,500	668,250	684,956	702,080	719,632	737,623	756,064	774,965	794,339	814,198	834,553
Legal & Accounting/Community Affairs	144,000	36,000	36,720	37,454	38,203	38,968	39,747	40,542	41,353	42,180	43,023
Office/Lab Supplies & Expenses	120,000	120,000	122,400	124,848	127,345	129,892	132,490	135,139	137,842	140,599	143,411
Travel, Training & Miscellaneous	56,600	34,650	35,343	36,050	36,771	37,506	38,256	39,022	39,802	40,598	41,410
EBITD	(995,710)	16,694,935	28,336,019	29,350,388	30,388,910	31,452,089	32,540,441	33,654,492	34,794,777	33,149,345	34,343,752
Less:											
Interest - Operating Line of Credit	0	0	0	0	0	0	0	0	0	0	0
Interest - Senior Debt	0	3,112,776	6,034,168	5,594,619	5,118,588	4,603,046	4,044,715	3,440,043	2,785,183	2,075,969	1,307,892
Interest - Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Depreciation & Amortization	0	2,640,810	5,744,913	5,749,913	5,754,913	5,759,913	5,764,913	5,769,913	5,774,913	5,779,913	5,784,913
Pre-Tax Income	(995,710)	10,941,349	16,556,938	18,005,857	19,515,410	21,089,130	22,730,814	24,444,537	26,234,682	25,293,463	27,250,947
Current Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Net Earnings (Loss) for the Year	(995,710)	10,941,349	16,556,938	18,005,857	19,515,410	21,089,130	22,730,814	24,444,537	26,234,682	25,293,463	27,250,947

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Proforma Statements of Cash Flows

	Construction (1 Year)	1st Year Operations	2nd Year Operations	3rd Year Operations	4th Year Operations	5th Year Operations	6th Year Operations	7th Year Operations	8th Year Operations	9th Year Operations	10th Year Operations
Cash provided by (used in)											
Operating Activities											
Net Earnings (loss)	(995,710)	10,941,349	16,556,938	18,005,857	19,515,410	21,089,130	22,730,814	24,444,537	26,234,682	25,293,463	27,250,947
Non cash charges to operations											
Depreciation & Amortization	0	2,640,810	5,744,913	5,749,913	5,754,913	5,759,913	5,764,913	5,769,913	5,774,913	5,779,913	5,784,913
	(995,710)	13,582,159	22,301,851	23,755,769	25,270,322	26,849,043	28,495,726	30,214,449	32,009,595	31,073,375	33,035,859
Changes in non-cash working capital balances											
Accounts Receivable	0	2,456,117	33,926	49,081	50,056	51,050	52,063	53,097	54,152	55,227	56,324
Inventories	0	3,991,689	136,410	61,340	62,354	63,387	64,438	65,509	66,598	67,707	68,836
Prepaid Expenses	0	0	0	0	0	0	0	0	0	0	0
Accounts Payable	0	(1,027,504)	(40,626)	(11,395)	(11,524)	(11,653)	(11,785)	(11,918)	(12,052)	(12,189)	(12,327)
Income Taxes Payable	0	0	0	0	0	0	0	0	0	0	0
	0	5,420,302	129,710	99,026	100,887	102,784	104,717	106,688	108,697	110,745	112,833
Investing Activities											
Land Purchase	225,000	0	0	0	0	0	0	0	0	0	0
Fixed Asset Purchases	102,927,451	17,354,575	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Capitalized Fees & Interest	1,695,374	1,891,851	0	0	0	0	0	0	0	0	0
	104,847,826	19,246,426	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Financing Activities											
Long Term Debt Advances	53,963,935	23,855,465	0	0	0	0	0	0	0	0	0
Repayment of Long Term Debt	0	(3,483,414)	(5,584,923)	(6,048,468)	(6,550,488)	(7,094,176)	(7,682,989)	(8,320,673)	(9,011,285)	(9,759,217)	(10,569,227)
Subordinated Debt Advances	0	0	0	0	0	0	0	0	0	0	0
Repayment of Subordinated Debt	0	0	0	0	0	0	0	0	0	0	0
Equity Investment	51,879,600	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0	0
Cash Sweep for Debt Service	0	0	0	0	0	0	0	0	0	0	0
Distributions to Shareholders	0	0	0	0	0	0	0	0	0	0	0
Net Increase (Decrease) in Cash	0	9,287,481	16,487,219	17,508,275	18,518,947	19,552,084	20,608,020	21,687,088	22,789,613	21,103,413	22,253,799
Cash (Indebtedness), Beginning of Year	0	0	9,287,481	25,774,700	43,282,975	61,801,922	81,354,006	101,962,027	123,649,115	146,438,728	167,542,141
Cash (Bank Indebtedness), End of Year	0	9,287,481	25,774,700	43,282,975	61,801,922	81,354,006	101,962,027	123,649,115	146,438,728	167,542,141	189,795,940

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Funding Schedule
Months 1-24

Month	Project Development	Fees & Other Expenses	Cash Required By Operations	Current Month Disbursements	Equity/Grant Investment	Subordinated Debt	Interest Payment (Earnings)	Loan (Equity) Balance
1	8,752,288	861,277	12,375	9,625,940	(51,879,600)	0	(105,634)	(42,359,294)
2	8,527,288	83,083	12,375	8,622,746	0	0	(84,341)	(33,820,890)
3	8,527,288	83,083	12,375	8,622,746	0	0	(62,995)	(25,261,139)
4	8,527,288	83,083	12,375	8,622,746	0	0	(41,596)	(16,679,989)
5	8,527,288	83,083	12,375	8,622,746	0	0	(53,715)	(8,110,958)
6	8,527,288	83,083	12,375	8,622,746	0	0	3,412	515,200
7	8,777,288	83,083	12,375	8,872,746	0	0	62,586	9,450,532
8	8,664,788	83,083	12,375	8,760,246	0	0	121,405	18,332,183
9	8,664,788	87,483	12,375	8,764,646	0	0	180,646	27,277,474
10	8,664,788	87,483	12,375	8,764,646	0	0	240,281	36,282,401
11	8,414,788	87,483	12,375	8,514,646	0	0	298,647	45,095,694
12	8,577,288	87,483	12,375	8,677,146	0	0	358,486	54,131,326
13	9,027,288	19,250	276,625	9,323,163	0	0	423,030	63,877,518
14	8,327,288	19,250	276,625	8,623,163	0	0	483,338	72,984,019
15	0	19,250	659,099	678,349	0	0	491,082	74,153,450
16	0	6,600	0	6,600	0	0	494,400	74,654,451
17	0	6,600	0	6,600	0	0	497,740	75,158,791
18	0	6,600	0	6,600	0	0	501,103	75,666,494
19	0	6,600	0	6,600	0	0	501,103	76,174,196
20	0	6,600	0	6,600	0	0	501,103	76,681,899
21	0	6,600	0	6,600	0	0	501,103	77,189,601
22	0	6,600	0	6,600	0	0	501,103	77,697,304
23	0	6,600	0	6,600	0	0	501,103	78,205,007
24	0	6,600	0	6,600	0	0	501,103	78,712,709
Total	120,507,026	1,909,944	1,323,724	123,777,820	(51,879,600)	0	6,814,490	78,712,709

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Engineering & Construction Cost Summary

Month	Land	Rolling Stock, Tools & Spare Parts	Site Prep. & Admin. Building	Rail Improve-ments	Equipment & Installation	Engineering Fees	Construction & Procurement Fees	Contingency	Monthly Total
1	225,000	0	200,000	0	6,605,571	632,872	505,935	582,909	8,752,288
2	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
3	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
4	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
5	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
6	0	0	200,000	0	6,605,571	632,872	505,935	582,909	8,527,288
7	0	0	200,000	250,000	6,605,571	632,872	505,935	582,909	8,777,288
8	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
9	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
10	0	0	87,500	250,000	6,605,571	632,872	505,935	582,909	8,664,788
11	0	0	87,500	0	6,605,571	632,872	505,935	582,909	8,414,788
12	0	250,000	0	0	6,605,571	632,872	505,935	582,909	8,577,288
13	0	700,000	0	0	6,605,571	632,872	505,935	582,909	9,027,288
14	0	0	0	0	6,605,571	632,872	505,935	582,909	8,327,288
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
TOTAL	225,000	950,000	1,750,000	1,000,000	92,478,000	8,860,213	7,083,090	8,160,723	120,507,026

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Production & Sales, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Fuel Ethanol											
Gallons Produced	0	0	2,916,667	4,375,000	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333	5,833,333
Gallons Sent to Inventory	0	0	800,000	800,000	0	0	0	0	0	0	0
Denaturant Added	0	0	145,833	218,750	291,667	291,667	291,667	291,667	291,667	291,667	291,667
Net Gallons Sold (Denatured)	0	0	2,222,500	3,753,750	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000	6,125,000
Selling Price/Gallon (FOB Plant)	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289	$1.1289
State Producer Payment	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040	$0.040
Federal Small Producer Payment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Total Revenue - Fuel Ethanol	0	0	2,598,277	4,388,429	7,160,606	7,160,606	7,160,606	7,160,606	7,160,606	7,160,606	7,160,606
Lignin Residue											
Dry Tons Produced	0	0	32,652	48,978	65,304	65,304	65,304	65,304	65,304	65,304	65,304
Tons Sent to Inventory	0	0	11,195	11,195	0	0	0	0	0	0	0
Net Tons Sold	0	0	21,457	37,783	65,304	65,304	65,304	65,304	65,304	65,304	65,304
Selling Price/Dry Ton	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18	$3.18
Total Revenue - Lignin Residue	0	0	68,259	120,195	207,745	207,745	207,745	207,745	207,745	207,745	207,745
CO_2											
Tons Produced	0	0	7,292	10,938	14,583	14,583	14,583	14,583	14,583	14,583	14,583
Tons Sent to Inventory	0	0	0	0	0	0	0	0	0	0	0
Net Tons Sold	0	0	7,292	10,938	14,583	14,583	14,583	14,583	14,583	14,583	14,583
Selling Price/Ton	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue - CO2	0	0	0	0	0	0	0	0	0	0	0
Total Revenue - All Products	0	0	2,666,536	4,508,624	7,368,351	7,368,351	7,368,351	7,368,351	7,368,351	7,368,351	7,368,351

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Operating Expense, Months 13-23

	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23
Plant Operating Rate	0.00%	0.00%	50.00%	75.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BDT Biomass for Processing	0	0	32,516	48,774	65,032	65,032	65,032	65,032	65,032	65,032	65,032
BDT Biomass to Inventory	0	0	22,297	22,297	0	0	0	0	0	0	0
$/BDT Biomass (Delivered)	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860	$33.860
Biomass Expense	0	0	1,855,946	2,406,438	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970
Total Feedstock Expense	0	0	1,855,946	2,406,438	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970	2,201,970
Electricity (KWH)	0	0	4,141,667	6,212,500	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333	8,283,333
$/KWH	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300	$0.0300
Electricity Expense	0	0	124,250	186,375	248,500	248,500	248,500	248,500	248,500	248,500	248,500
Natural Gas (MMBTU)	0	0	107,402	161,103	214,804	214,804	214,804	214,804	214,804	214,804	214,804
$/MMBTU	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000	$3.0000
Natural Gas Expense	0	0	322,206	483,308	644,411	644,411	644,411	644,411	644,411	644,411	644,411
Makeup Water ('000 Gal.)	0	0	17,439	26,158	34,877	34,877	34,877	34,877	34,877	34,877	34,877
$/1000 Gal.	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000	$0.5000
Makeup Water Expense	0	0	8,719	13,079	17,439	17,439	17,439	17,439	17,439	17,439	17,439
Effluent Disposal ('000 Gal)	0	0	11,147	16,720	22,293	22,293	22,293	22,293	22,293	22,293	22,293
$/1000 Gal.	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000	$1.0000
Effluent Disposal Expense	0	0	11,147	16,720	22,293	22,293	22,293	22,293	22,293	22,293	22,293
Solid Waste Disposal (Tons)	0	0	2,814	4,220	5,627	5,627	5,627	5,627	5,627	5,627	5,627
$/Ton	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000	$10.0000
Solid Waste Disposal Expense	0	0	28,137	42,205	56,273	56,273	56,273	56,273	56,273	56,273	56,273
Labor & Benefits	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625	266,625
Maintenance Materials & Services	0	0	77,065	115,598	154,130	154,130	154,130	154,130	154,130	154,130	154,130
Taxes & Insurance	0	0	0	18,750	18,750	18,750	18,750	18,750	18,750	18,750	18,750
Denaturants	0	0	102,083	153,125	204,167	204,167	204,167	204,167	204,167	204,167	204,167
Purchased Cellulase Enzymes	0	0	294,000	441,000	588,000	588,000	588,000	588,000	588,000	588,000	588,000
Other Chemicals	0	0	225,458	338,188	450,917	450,917	450,917	450,917	450,917	450,917	450,917
Office/Lab Supplies & Expenses	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Total Monthly Expense (non-feedstock)	276,625	276,625	1,469,690	2,084,972	2,681,504	2,681,504	2,681,504	2,681,504	2,681,504	2,681,504	2,681,504
Total Monthly Profit (Loss)	(276,625)	(276,625)	(659,099)	17,214	2,484,877	2,484,877	2,484,877	2,484,877	2,484,877	2,484,877	2,484,877

NREL Bioethanol Co-Location Study -- Grand Island, NE Site
Interim Period Fees & Expenses
Months 1-24

Month	Lender/ Placement Fees	Organizational Costs	Legal/ Accounting Expenses	Political/ Community Relations	Financial Consultants	Construction Consultants	Hiring & Training	Travel	Contingency @ 10%	Monthly Total
1	778,194	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	861,277
2	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
3	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
4	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
5	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
6	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
7	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
8	0	$58,333	10,000	2,000	2,000	7,500	0	1,000	2,250	83,083
9	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
10	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
11	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
12	0	$58,333	10,000	2,000	2,000	7,500	4,000	1,000	2,650	87,483
13	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
14	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
15	0	0	2,000	1,000	2,000	7,500	4,000	1,000	1,750	19,250
16	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
17	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
18	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
19	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
20	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
21	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
22	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
23	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
24	0	0	2,000	1,000	2,000	0	0	1,000	600	6,600
TOTAL	778,194	700,000	144,000	36,000	48,000	112,500	28,000	24,000	39,250	1,909,944

Interim Period Labor Summary
Months 1-24

Position	General Manager	Plant Manager	Environ. & Safety Mgr.	Controller	Commodity Manager	Admin. Assistant	Microbiologist	Lab Technician	Shift Team Leader	Shift Operator	Yard Labor
Number Employed	(1)	(1)	(1)	(1)	(1)	(5)	(1)	(2)	(4)	(20)	(20)
Annual Salary	110,000	80,000	60,000	65,000	60,000	24,000	45,000	28,000	44,000	30,000	25,000
Month											
1	9,167	0	0	0	0	0	0	0	0	0	0
2	9,167	0	0	0	0	0	0	0	0	0	0
3	9,167	0	0	0	0	0	0	0	0	0	0
4	9,167	0	0	0	0	0	0	0	0	0	0
5	9,167	0	0	0	0	0	0	0	0	0	0
6	9,167	0	0	0	0	0	0	0	0	0	0
7	9,167	0	0	0	0	0	0	0	0	0	0
8	9,167	0	0	0	0	0	0	0	0	0	0
9	9,167	0	0	0	0	0	0	0	0	0	0
10	9,167	0	0	0	0	0	0	0	0	0	0
11	9,167	0	0	0	0	0	0	0	0	0	0
12	9,167	0	0	0	0	0	0	0	0	0	0
13	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
14	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
15	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
16	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
17	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
18	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
19	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
20	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
21	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
22	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
23	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667
24	9,167	6,667	5,000	5,417	5,000	10,000	3,750	4,667	14,667	50,000	41,667

Interim Period Labor Summary
Months 1-24

Position	Maintenance Manager	Boiler Operator	Maintenance Worker	Welder	Electrician	Instrument Technician	Monthly Total	Benefits at	Total
Number Employed	(1)	(1)	(8)	(1)	(1)	(2)	(71)	35.00%	
Annual Salary	50,000	40,000	33,000	35,000	35,000	37,000			
Month									
1	0	0	0	0	0	0	9,167	3,208	12,375
2	0	0	0	0	0	0	9,167	3,208	12,375
3	0	0	0	0	0	0	9,167	3,208	12,375
4	0	0	0	0	0	0	9,167	3,208	12,375
5	0	0	0	0	0	0	9,167	3,208	12,375
6	0	0	0	0	0	0	9,167	3,208	12,375
7	0	0	0	0	0	0	9,167	3,208	12,375
8	0	0	0	0	0	0	9,167	3,208	12,375
9	0	0	0	0	0	0	9,167	3,208	12,375
10	0	0	0	0	0	0	9,167	3,208	12,375
11	0	0	0	0	0	0	9,167	3,208	12,375
12	0	0	0	0	0	0	9,167	3,208	12,375
13	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
14	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
15	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
16	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
17	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
18	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
19	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
20	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
21	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
22	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
23	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625
24	4,167	3,333	22,000	2,917	2,917	6,167	197,500	69,125	266,625

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13. ABSTRACT *(Maximum 200 words)*
This study looks at the feasibility of co-locating 30, 50, and 70 million gallon per year bioethanol facilities with coal fired power plants in Indiana and Nebraska. Corn stover is the feedstock for ethanol production in both cases.

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Bioethanol; corn stover; coal fired power plants; co-location

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